Retail Nutrition Programs and Outcomes: An Evidence Analysis Center Scoping Review

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ABSTRACT
As nutrition-related diseases contribute to rising health care costs, food retail settings are providing a unique opportunity for registered dietitian nutritionists (RDNs) to address the nutritional needs of consumers. Food as Medicine interventions play a role in preventing and/or managing many chronic conditions that drive health care costs. The objective of this scoping review was to identify and characterize literature examining Food as Medicine interventions within food retail settings and across consumer demographics. An electronic literature search of 8 databases identified 11,404 relevant articles. Results from the searches were screened against inclusion criteria, and intervention effectiveness was assessed for the following outcomes: improvement in health outcomes and cost-effectiveness. One-hundred and eighty-six papers and 25 systematic reviews met inclusion criteria. Five categories surfaced as single interventions: prescription programs, incentive programs, medically tailored nutrition, path-to-purchase marketing, and personalized nutrition education. Multiple combinations of intervention categories, reporting of health outcomes (nutritional quality of shopping purchases, eating habits, biometric measures), and cost-effectiveness (store sales, health care dollar savings) also emerged. The intervention categories that produced both improved health outcomes and cost-effectiveness included a combination of incentive programs, personalized nutrition education, and path-to-purchase marketing. Food as Medicine interventions in the food retail setting can aid consumers in navigating health through diet and nutrition by encompassing the following strategic focus areas: promotion of health and well-being, managing chronic disease, and improving food security. Food retailers should consider the target population and desired focus areas and should engage registered dietitian nutritionists when developing Food as Medicine interventions.
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Supplementary materials: Figures 2, 3, and 5 are available at www.jandonline.org.

THE CONCEPT OF FOOD AS medicine is rooted in our most ancient healing traditions. Around 2,500 years ago, Hippocrates first said, "Let food be thy medicine and medicine be thy food." What was an existing concept has now become a new movement on the rise: Food as Medicine. Diet-related disease is a leading driver of soaring health care costs,[1] and by addressing nutritional needs within the context of health, Food as Medicine interventions address prevention and management of many chronic conditions that affect health care costs. However, chronic disease is difficult to address within the current structure of our health care system alone, which consists of an array of clinicians, hospitals, and other health care facilities, insurance plans, and purchasers of health care services, all operating in various configurations of groups, networks, and independent practices.[2] Innovative solutions are needed to reduce comorbidities, and the food retail setting provides a unique opportunity for registered dietitian nutritionists (RDNs) to address nutritional needs within the context of health by providing much-needed access points and by meeting consumers in an environment where they are making food decisions.

Food retailers are critical allies in building momentum for Food as Medicine interventions. The expansion of health and wellness programs in food retail settings is predicted to continue as supermarkets capitalize on their capabilities to provide solutions that meet consumer needs within the changing health care environment.[3] According to the Food Marketing Institute's *2019 Report on Retailer Contributions to Health & Wellness*, 90% of food retailers surveyed reported having an established health and wellness program for customers, employees, or both.[3] Eighty-five percent of survey respondents reported employing RDNs at the corporate level and/or regionally and a small percentage as consultants. Seventy-three percent of survey respondents reported employing pharmacists and a few other health disciplines, such as health coaches (19%), physician assistants (10%), and nurse practitioners (10%).

RDNs working in the food retail setting serve as a liaison between food retailers and consumers and play a key role in aligning food retail departments, pharmacy, in-store clinics, health care providers, managed care organizations, employers, and food manufacturers to improve and maintain preventive wellness measures and address chronic disease challenges with consumers. Food retailers with established health and well-being programs report that business growth is the top reason they value these programs.[3] In order to help food retailers identify what has worked, what needs to be improved, and what is not a viable program option, the Academy of Nutrition and Dietetics (Academy) and the Academy Foundation embarked on a new project in 2019 titled, "Leveraging RDNs in the Food Retail Environment to Improve Public Health." This project included multiple components and was led by the

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Foundation's Nutrition in Food Retail Program Development Fellow. The Nutrition in Food Retail Program Development Fellow, guided by an expert advisory group composed of 19 individuals and 2 members of the Academy Board of Directors represented food retail, business, health care, public health and research/education backgrounds, as well as 3 Academy staff, attended 2 roundtable meetings in November 2019 and April 2020. The purpose of these roundtables was to outline a landscape for Food as Medicine within food retail settings that defines Food as Medicine, identify potential pathways to intersect Food as Medicine with the role of RDNs within food retail, and provide recommendations for integrating Food as Medicine interventions within current retail nutrition models. Outcomes from the roundtable meeting, in addition to findings from the scoping review, will support the creation of a business case for food retailers to adopt and implement a Food as Medicine retail model that is scalable and produces a positive return on investment (ROI).

The objective of this scoping review was to identify and characterize studies and literature examining food retail programs related to nutrition, as well as Food as Medicine interventions across a spectrum of populations and contexts. The focus was on personalized nutrition education, path-to-purchase marketing, medically tailored nutrition, prescription programs, and incentive programs. Understanding the landscape of literature on existing programs and interventions could help to inform the need/scope and development of future program model(s) that are financially feasible, scalable, and meet the needs of both consumers and food retailers.

Therefore, the research question for this scoping review is: Among the existing peer-reviewed literature on food retail programs related to nutrition as well as Food as Medicine interventions, which of these programs lead to improvement in health outcomes and cost-effectiveness?

METHODS

Methods were adapted according to the objective of the scoping review. The protocol used was based on the methodological framework from the works of Arskey and O'Malley,[4] Levac and colleagues,[5] and the Joanna Briggs Institute,[6] and also followed the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) Statement,[7] in accordance with the PRISMA-Protocols 2015 checklist.[6]

Eligibility Criteria and Search Strategy

The scope was defined through support of the Academy Foundation's Nutrition in Food Retail Program Development fellow; the Academy's Research, International, and Scientific Affairs team; and content experts. Based on an initial review of literature and previous knowledge of the food retail nutrition landscape, a logic model was created to help guide the search plan (Figure 1). A logic model is a summary diagram that maps out an intervention and conjectured links between the intervention and anticipated outcomes in order to develop a summarized theory of how a complex intervention works.[6] Key search terms related to setting, interventions, behavior change, outcome, and cost–benefit analysis were determined based on the logic model (Figure 2; available at www.jandonline.org). Eligibility criteria were developed using an iterative process as the reviewers became more familiar with the literature and were based on the Population, Concept, and Context mnemonic, as recommended by the Joanna Briggs Institute[6] (Figure 3; available at www.jandonline.org). The population of this scoping review included individuals 18 years or older, with no limits on sex or socioeconomic status. The concept related to interventions that aimed to increase awareness, knowledge, and/or skills of food purchasing decisions; impacted consumer demand, accessibility, and/or affordability to choose healthier foods and drinks; and produced an outcome that resulted in increased sales/purchase of healthy foods, increased intake of healthy foods, and/or improved health outcomes. The context was set within food retail grocery stores or related settings, and the studies were limited to peer-reviewed literature with publication dates after 1970 and English language abstracts. Retail nutrition content experts reviewed the search plan to confirm the direction of the scope.

Information Sources

A systematic search of the following databases was performed on October 2, 2019: MEDLINE (Ovid), Embase (Ovid), PsycINFO (Ovid), CINAHL (Ebsco), Web of Science (Clarivate Analytics), Cochrane Central Register of Controlled Trials (Ovid), Cochrane Database of Systematic Reviews (Ovid), and National Health Service Economic Evaluation Database (Ovid). The search was conducted by a systematic review librarian and terms were adapted according to the database searched.

Data Extraction and Evidence Mapping

Search results were uploaded to Rayyan, an abstract screening software.[8] Duplicates were removed using a standard function, and the remaining titles and abstracts were screened by one reviewer with extensive experience in retail nutrition to ensure consistency. Article screening was undertaken in 2 stages: first, titles and abstracts of all identified studies potentially eligible for inclusion in the review were screened against the inclusion criteria (Figure 3; available at www.jandonline.org); second, full text of eligible articles was screened to confirm whether the study should be included in the final review. The included articles were exported from Rayyan to Excel (Microsoft) and data were manually extracted and synthesized according to the intervention applied and then further categorized according to publication characteristics (title, author, year of publication, journal); population characteristics (general, low income, Supplemental Nutrition Assistance Program [SNAP], Special Supplemental Nutrition Program for Women, Infants and Children); disease diagnosis characteristics (diabetes, obesity/overweight, hypertension, or no disease diagnosis); intervention characteristics (intervention category, type of intervention); and outcome characteristics (sales, nutritional quality of shopping purchases, consumption habits, health outcomes, health care dollar savings).

RESULTS

The literature search resulted in 11,404 articles with 32 additional references identified by a content expert. As shown in Figure 4, 5,075 duplicate records were removed. A

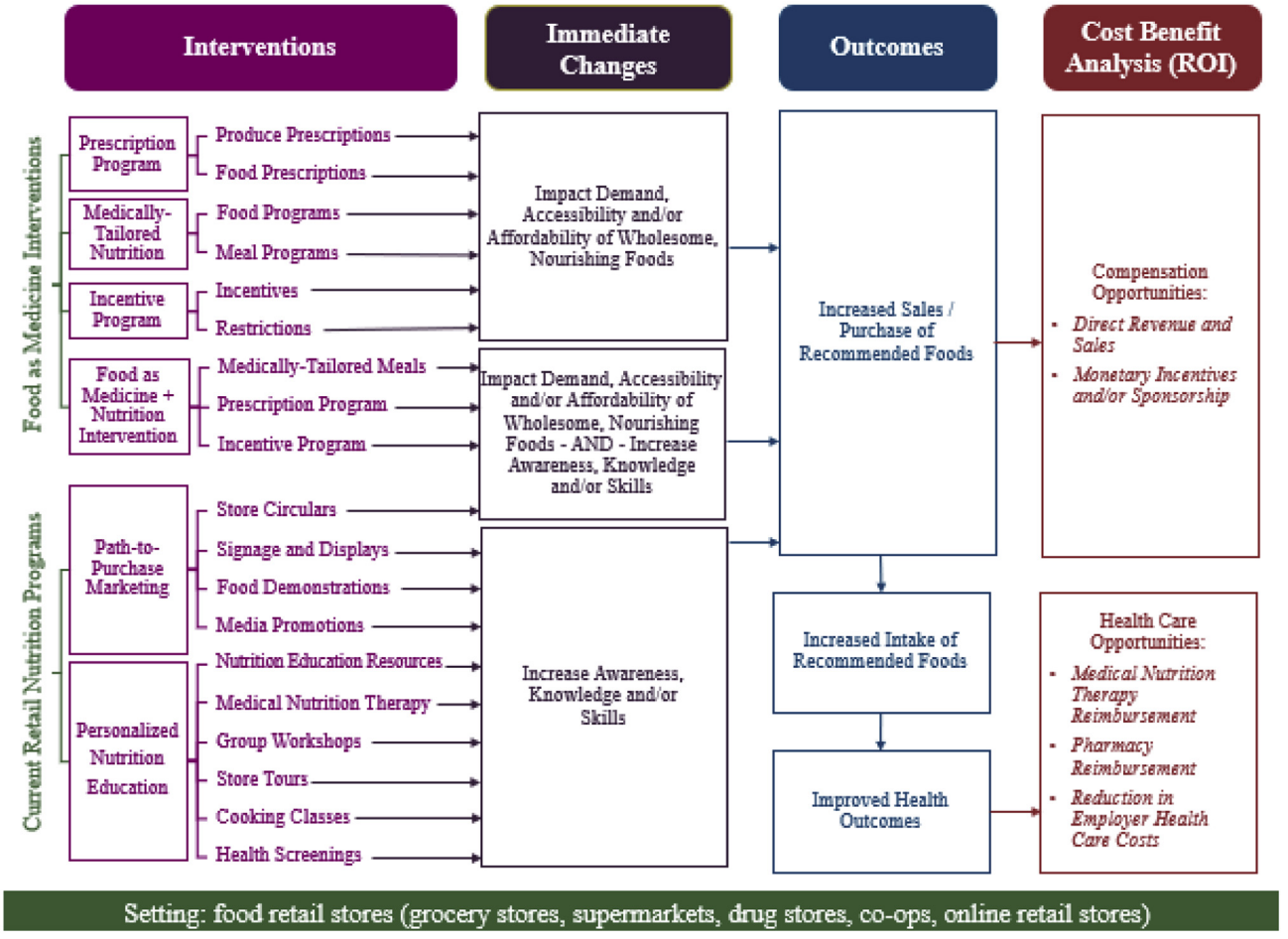

Figure 1. Logic model for retail nutrition programs and outcomes. ROI = return on investment.

total of 6,361 references, based on title and abstract, were screened against the inclusion criteria, and 6,049 records were removed due to lack of relevance for this review. Of the 292 articles assessed for eligibility, 211 met the inclusion criteria and were included in this scoping review. Of the 211 included studies, 25 were systematic reviews/meta-analyses[9-33] (Figure 5; available at www.jandonline.org) and the rest were original research (n = 186).

Included Studies

The majority of the studies were conducted in a grocery store/supermarket setting (61%); followed by farmer's markets/mobile produce markets (17%); multiple settings, such as grocery stores, farmer's markets, and other retail locations, participating in the intervention (11%); drug store/pharmacies (4%), corner/convenience stores (3%); online retail settings (2%); and retail clinics (1%). Of the 186 original research publications included, only 76 studies provided socioeconomic information and, of those 76 studies, 61% researched low-income populations that did not receive government assistance benefits (n = 46),[34-79] 26% focused solely on SNAP beneficiaries (n = 20),[80-99] and 13% were geared toward individuals receiving benefits from Special Supplemental Nutrition Program for Women, Infants and Children (n = 10)[100-109] (Figure 6). As depicted in Figure 7, only 20 studies researched populations by disease state; of these, 50% of the studies were focused on individuals diagnosed with diabetes (n = 10),[35,39,72,110-116] 35% on individual's with an overweight/obesity diagnosis (n = 7),[37,43,117-121] and 15% on individuals diagnosed with hypertension (n = 3).[44,122,123]

Intervention Categories

In addition to the 5 single category interventions outlined through the Logic Model in Figure 1 (prescription program, medically tailored nutrition, incentive program, path-to-purchase marketing, and personalized nutrition education), additional intervention subcategories were identified throughout the screening process and have been highlighted within a detailed framework that shows Food as Medicine interventions, retail nutrition interventions, or a combination of multiple category intervention studies (Figure 8). Although Food as Medicine and nutrition interventions were

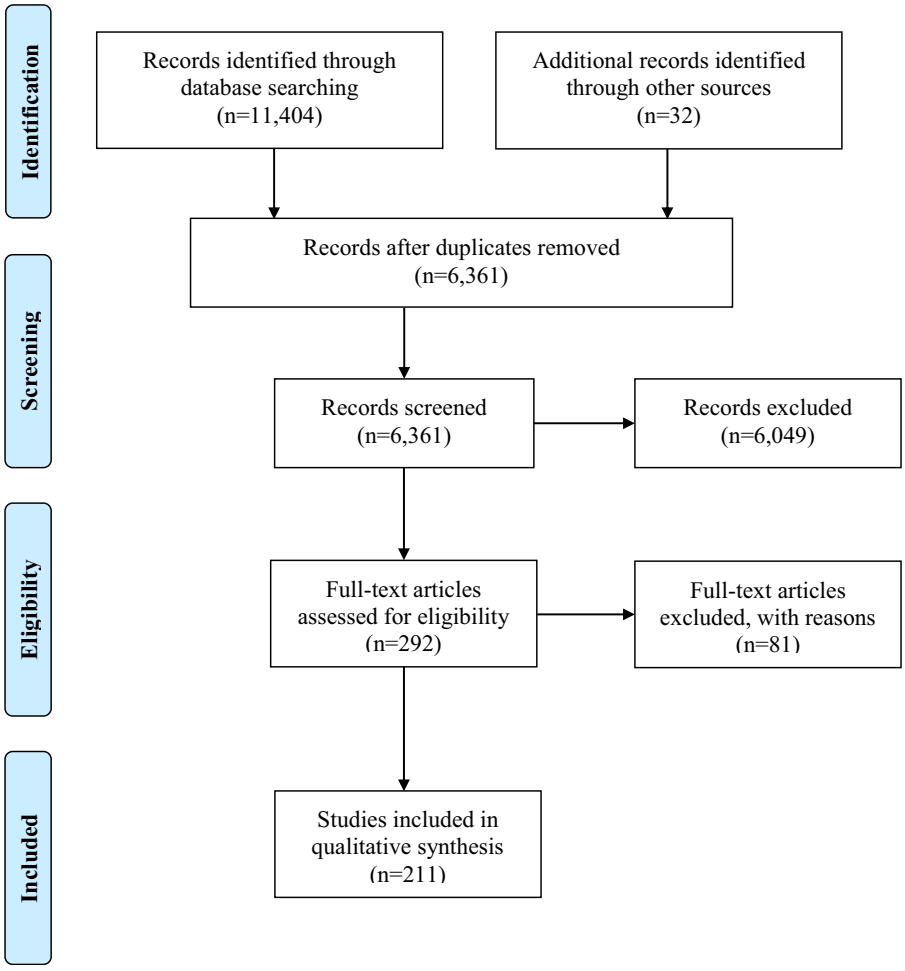

Figure 4. Preferred Reporting Items for Systematic Reviews and Meta-Analysis flow diagram: retail nutrition programs and outcomes scoping review.

grouped as a category in Figure 1, multiple combinations of Food as Medicine interventions and retail nutrition programs were discovered during the scoping review and have been expanded in Figure 8.

Food as Medicine Interventions. Most of the research in this category focused on incentive programs. The

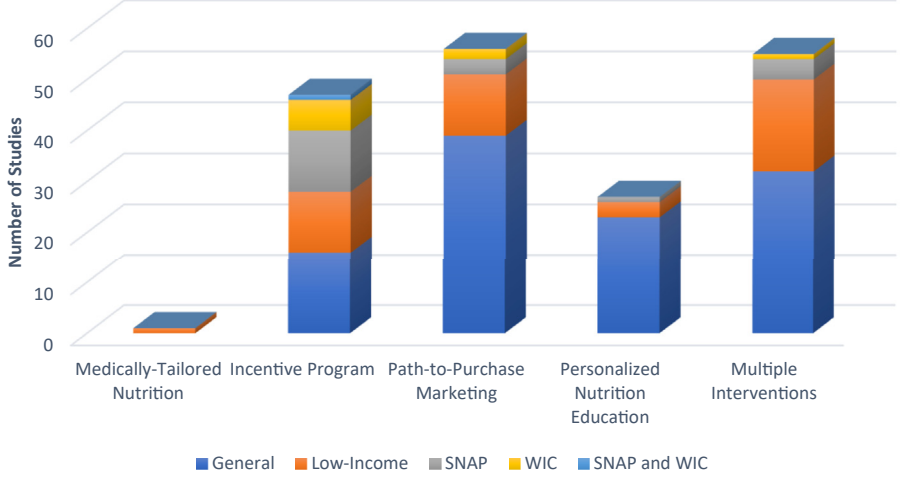

Figure 6. Number of studies reporting food as medicine and retail nutrition programs by population. SNAP = Supplemental Nutrition Assistance Program; WIC = Special Supplemental Nutrition Program for Women, Infants and Children.

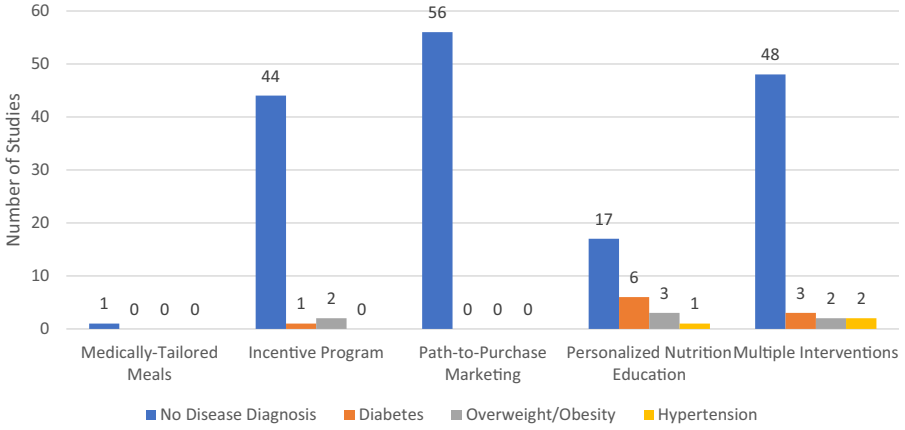

Figure 7. Number of studies reporting food as medicine and retail nutrition programs by disease diagnosis.

search did not identify any study that focused on prescription program as an intervention by itself; however, several studies were included in which prescription program interventions were combined with other category interventions.

Incentive programs. Of the 47 studies related to incentive program, most of the research focused on increasing the affordability of recommended food items through coupons and vouchers (n = 18)[68-72,77-79,89,98,103-109,124] discounted pricing on fruits and

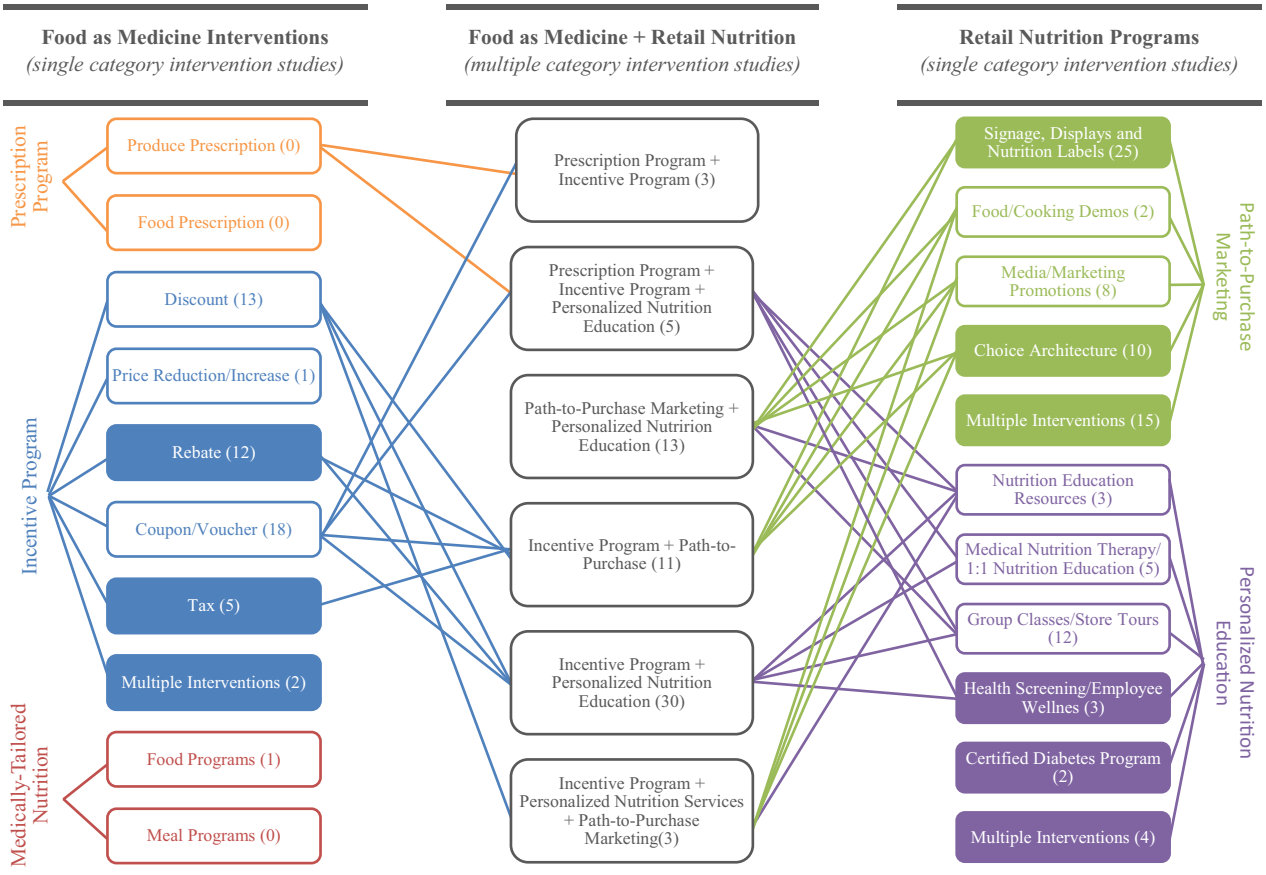

Figure 8. Food as Medicine: Retail nutrition integration framework. Intervention categories are separated by color. Orange = prescription program; blue = incentive program; red = medically tailored nutrition; green = point of purchase marketing and education; purple = personalized nutrition services). Lines represent integration opportunities among categories. Shaded boxes indicate new topics identified.

vegetables (n = 10),[74-76,94,99,120,121,125-127] and rebates in the form of cash, discount coupons, and other incentives (n = 12).[73,88,90-93,97,128-132] A smaller number of studies applied a tax to disincentivize specific purchases, such as sugar-sweetened beverages (n = 5),[95,133-136] and 2 studies looked at the effectiveness of a discount program in combination with a tax disincentive[137] and coupon vouchers.[96]

Medically tailored nutrition interventions. Although there is ample Food as Medicine research supporting the positive outcomes of medically tailored nutrition interventions,[138-145] only 1 study was conducted in the retail setting and met the inclusion criteria.[64]

Retail Nutrition Programs. ***Path-to-purchase marketing.*** Of the 56 studies related to path-to-purchase marketing, the majority of the research focused on in-store signage, displays, and nutrition labels (n = 22),[146-167] and a smaller number of studies discussed product placement and increased availability of healthy foods through choice architecture (n = 10),[55,61,85,101,168-173] effectiveness of media promotions and marketing strategies (n = 8),[84,174-180] and the nutritional quality of shopping purchases resulting from in-store food/cooking demonstrations (n = 2).[58,181] Eleven studies reviewed a combination of interventions within the path-to-purchase marketing category.[52-54,57,59,60,62,63,86,102]

Personalized nutrition education. Of the 27 studies related to personalized nutrition education, the majority focused on changes in shopping purchases and eating habits through group classes and store tours (n = 10).[67,111,112,117,185-189] A smaller number of studies looked at the effectiveness of medical nutrition therapy or one-on-one nutrition education (n = 5);[114,116,119,122,190] nutrition education resources, such as print materials (eg, handouts, brochures, and recipe cards) and online nutrition content (n = 3)[87,191,192]; health screenings and employee wellness programs (n = 3)[193-195]; and Certified Diabetes Education programs offered within a retail setting (n = 2).[113,115] Three studies focused on one-on-one nutrition education combined with group classes/store tours[66,118] and nutrition education resources,[196] and 1 study reviewed eating habit outcomes when both group classes/store tours and nutrition education resources were applied.[65]

Multiple Category Interventions. In addition to the single category interventions studied, multiple combinations of Food as Medicine interventions and retail nutrition program categories also emerged and were added to the Food as Medicine–Retail Nutrition Integration framework (Figure 8):

- Personalized nutrition education plus incentive programs (n = 25)[35-38,40-43,45,50,80,81,82,100,110,123,183,197,198,205,208,209,211,213,216]
- Personalized nutrition education plus path-to-purchase marketing (n = 7)[83,201,206,210,212,214,215]
- Incentive program plus path-to-purchase marketing (n = 8)[47,182,199,200,202-204,207]
- Incentive program plus personalized nutrition education plus prescription program (n = 3)[44,49,51]
- Incentive program plus prescription program (n = 3)[34,39,48]
- Incentive program plus personalized nutrition education plus path-to-purchase marketing (n = 1)[46]

Intervention Effectiveness

The main program outcomes reported included health behavior outcomes (nutritional quality of shopping purchases, eating habits, and biometric measures) and cost-effectiveness (store sales, health care dollar savings). The distribution of outcomes assessed in the studies by intervention category is illustrated with a heat map (Figure 9). Of 186 studies, 72% of the Food as Medicine interventions and retail nutrition programs studied were found to be effective in one or more of the outcomes reported (n = 133).

Store Sales. Sixty-six studies looked at the impact of interventions on store sales and ROI for the food retailer. Fifty studies reported an increase in store sales after the intervention, with the greatest outcomes produced by coupon/vouchers (n = 11),[68-71,89,98,103,106,107,109,124] signage, displays and nutrition labels (n = 8),[149,151,153,158,159,164,165,167] rebate programs (n = 4),[88,90,93,130] and a combination of incentive programs with path-to-purchase marketing (n = 3).[182,199,200]

Nutritional Quality of Shopping Purchases. Seventy-two studies examined the effectiveness of interventions on nutritional quality of shopping purchases. The categories found to be most effective at producing healthier shopping behaviors and purchases were signage, displays and nutrition labels (n = 9)[146,148,150,153,155,157,162,163,166], group classes/store tours (n = 5)[67,184,186,187,189]; and a combination of incentive program, path-to-purchase marketing and personalized nutrition education (n = 21).[40,42,45,47,81,110,183,197,201-213]

Eating Habits. Sixty-five studies looked at behavior change, focusing on improvement in eating habits, such as inclusion of more fruits and vegetables in the diet or the consumption of fewer sugar-sweetened beverages. Fifty-four studies reported improvements in eating habits, with coupon/vouchers (n = 8)[69,72,77,78,89,98,104,108] and a combination of personalized nutrition education with path-to-purchase marketing (n = 3)[83,214,215] and incentive programs (n = 14)[36,37,41,43,45,80-82,100,123,198,205,211,216] resulting in the most improvement in eating habits.

Health Outcomes. Twenty studies researched health outcomes as a result of intervention applied. Fifteen studies reported an improvement in health outcomes, with price discounts (n = 2),[94,99] group classes/store tours (n = 2),[111,112] and a combination of medical nutrition therapy/one-on-one nutrition education with group classes/store tours (n = 2)[66,118] resulting in the most successful improvements in biometric measures.

Health Care Dollar Savings. Only 2 studies looked at the cost–benefit analysis of interventions in the form of health care dollar savings and both studies reported a positive impact on health care ROI. One study implemented employee wellness interventions with food retail employees

			Outcomes										
			Store Sales				Nutritional Quality of Shopping Purchases		Eating Habits		Health Outcomes		Health Care Savings
			Increased Sales	No Change in Sales	Decreased Sales	Increased/ Decreased Sales	Healthier Shopping Purchases	No Change in Shopping Purchases	Improved Eating Habits	No Change in Eating Habits	Improved Health Outcomes	No Change in Health Outcomes	Produced Healthcare Savings
Interventions	Path-to-Purchase Marketing (PPM)	S/D/NL (TS = 22)	8	5	2	0	9	5	1	0	1	0	0
		FD/CD (TS = 2)	1	0	0	0	1	0	1	0	0	0	0
		MP/MS (TS = 8)	3	1	0	0	3	0	2	0	0	0	0
		CA (TS = 10)	2	3	1	0	4	1	1	2	0	0	0
		S/D/NL + CA (TS = 5)	3	1	0	0	0	2	0	1	0	0	0
		S/D/NL + FD/CD (TS = 3)	1	1	0	0	1	0	0	0	0	0	0
		S/D/NL + MP/MS (TS = 1)	0	1	0	0	0	0	0	0	0	0	0
		S/D/NL + FD/CD + MP/MS (TS = 1)	0	0	0	0	1	0	0	0	0	0	0
		S/D/NL + FD/CD + CA (TS = 3)	3	0	0	0	0	0	0	0	0	0	0
		S/D/NL + MP/MS + CA (TS = 1)	0	0	0	0	1	0	0	0	0	0	0
	Personalized Nutrition Education (PNE)	NER (TS = 3)	0	0	0	0	1	0	2	0	0	0	0
		MNT (TS = 5)	0	0	0	0	2	0	1	0	1	1	0
		GC/ST (TS = 10)	1	0	0	0	5	1	2	0	2	0	0
		HS/EWP (TS = 3)	1	0	0	0	0	0	1	0	1	0	1
		CDP (TS = 2)	1	0	0	0	0	0	0	0	2	0	0
		MNT + GC/ST (TS = 2)	0	0	0	0	0	0	1	0	2	0	0
		MNT + NER (TS = 1)	0	0	0	0	1	0	0	0	0	0	0
		NER + GC/ST (TS = 1)	0	0	0	0	0	0	1	1	0	0	0
	Medically-Tailored Nutrition	MTN (TS = 1)	0	0	0	0	0	0	1	0	0	0	0
	Incentive Program (IP)	Discount (TS = 10)	2	1	0	1	2	1	2	1	3	0	1
		PR/PI (TS = 1)	0	0	0	0	0	0	1	0	0	1	0
		Rebate (TS = 12)	4	1	0	0	4	1	4	1	0	1	0
		C/V (TS = 18)	11	1	0	0	2	1	8	1	0	0	0
		Tax (TS = 5)	0	0	0	4	1	1	0	0	0	0	0
		Discount + Tax (TS = 1)	0	0	0	0	0	0	1	0	0	0	0
		Discount + C/V (TS = 1)	1	0	0	0	0	0	0	0	0	0	0
	Multiple Interventions	PP + IP (TS = 2)	0	0	0	0	0	0	1	0	1	1	0
		PP + IP + PNE (TS = 3)	0	0	0	0	0	0	2	0	1	0	0
		PPM + PNE (TS = 12)	2	1	0	0	5	2	6	0	1	1	0
		IP + PPM (TS = 8)	3	1	0	0	5	0	1	1	0	0	0
		IP + PNE (TS = 26)	3	1	0	0	12	1	13	3	1	1	0
		IP + PNE + PPM (TS = 2)	0	0	0	0	0	0	2	0	0	0	0

Figure 9. The distribution of outcomes assessed by type of intervention is illustrated with a heat map. Red = 10+ studies; orange = 5 to 9 studies; yellow = 1 to 4 studies; green = no studies. CA = choice architecture; CDP = certified diabetes program; C/V = coupon/voucher program; FD/CD = food/cooking demos; GC/ST = group classes/store tours; HS/EWP = health screening/employee wellness program; MNT = medical nutrition therapy/one-on-one; MP/MS = media promotions/marketing strategies MTN = medically tailored food programs; NER = nutrition education resources nutrition education; PR/PI = price reduction/increase; S/D/NL = signage, displays, and nutrition labels.

and calculated an ROI of $4.33 for every dollar invested in the wellness program.[193] The second study looked at the effectiveness of a combined food incentive/disincentive program and found that offering a 30% incentive on fruits, vegetables, whole grains, fish, and plant-based oils to SNAP beneficiaries during a 5-year period would not only improve health outcomes, but was projected to also save $5.28 billion in health care costs[94] during that same 5-year period.

RDN Involvement

Of the 186 original research publications included, only 13 studies involved RDNs in the implementation of interventions and, of those 13 studies, 69% conducted personalized nutrition education interventions (n = 9)[65-67,111,113,117,118,122,185]; 23% were involved with multicategory interventions (n = 3)[37,100,208]; and 8% led path-to-purchase marketing efforts (n = 1).[60] Sixty-nine percent of the studies that involved RDNs utilized an integrated team of professionals, including a health care team of doctors, nurses, and pharmacists (n = 4)[66,67,113,118]; chefs (n = 3)[111,117,185]; and researchers (n = 2).[65,100]

DISCUSSION

The goal of this scoping review was to gain a better understanding of the landscape of Food as Medicine interventions and retail nutrition programs, which could help to inform the need/scope and development of future program model(s) that are financially feasible, scalable, and meet the needs of both consumers and food retailers.

The scoping review resulted in 4 key findings. First, Food as Medicine interventions in the retail setting are shown to be successful in producing either positive health outcomes or cost-effectiveness as single category interventions. Second, both ROI for the retailer and improved health outcomes for program participants were also achieved when multiple category interventions were implemented. Third, Food as Medicine interventions as well

as retail nutrition programs encompass 3 different focus areas: promotion of health and well-being, management of chronic disease, and improved food and nutrition security. Lastly, RDNs are mostly involved in personalized nutrition education categories within retail settings (either as single strategy or multicomponent interventions) and are often utilized as part of an integrated team of professionals that includes physicians, nurses, pharmacists, and chefs.

The 2016 review of supermarket interventions by Cameron and colleagues[30] found that 70% of interventions reported improvements in the healthiness of consumer purchases. This scoping review had similar findings, with 72% of the Food as Medicine interventions and retail nutrition programs found to be effective at achieving 1 or more of the outcomes reported. Path-to-purchase marketing and incentive programs produced the most positive outcomes as single-category interventions in terms of cost-effectiveness (increased sales and revenue). Personalized nutrition education contributed in producing positive behavior change among shoppers and program participants through healthier shopping purchases and improved eating habits.

Although the research did support that single category interventions resulted in either positive health outcomes or increased sales/revenue, the greatest opportunities to integrate Food as Medicine interventions with existing and future retail nutrition programs were shown through multiple-component interventions. Escaron and colleagues[29] and Gittelsohn and colleagues[210] concluded that the evidence for effectiveness of health interventions in store settings were stronger for interventions using a combination of strategies than for single category interventions, such as price discounts alone or prescription programs without additional interventions. A key finding from the review by Gittelsohn and colleagues[210] was the need for combined environmental (such as monetary incentives) and behavioral (such as nutrition education) approaches in small-store interventions. This scoping review concluded that studies demonstrating effectiveness with producing both improved health outcomes and ROI for the food retailer included a combination of intervention strategies: incentive programs, personalized nutrition education, and path-to-purchase marketing.

This scoping review indicated a gap in the research; the literature reviewed did not reveal many studies that investigated populations with specific disease diagnoses. This offers an opportunity for food retailers to focus on Food as Medicine interventions tailored to not only wellness/prevention programming, but also to specific conditions/diseases that could potentially lead to improved outcomes. Through a combination of incentive programs, personalized nutrition education and path-to-purchase marketing, food retailers utilizing all types of nutrition models can develop Food as Medicine programs and promotions that produce both health outcomes and ROI desirable to retail operations. With RDNs being the leading experts in nutrition science and medical nutrition therapy, food retailers with in-store RDN program models, as well as a disease-management focus, may also want to consider targeting Food as Medicine programs and promotions to customers who have been diagnosed with diabetes, overweight/obesity, and/or hypertension.

Although socioeconomic status was not a factor in the majority of the studies, it is important to note that for incentive programs (both as single-category and multiple-component interventions), low-income populations as well as individuals receiving SNAP and Special Supplemental Nutrition Program for Women, Infants and Children benefits made up a larger portion of the population than other intervention categories. Special attention to target population should be taken into consideration based on the intervention category being implemented, especially in food retail settings with an enhanced focus on improving food security.

There were several strengths of this scoping review in order to ensure all relevant literature was included and a strong methodology: inclusion criteria was broad; all adult individuals who make food purchasing decisions were included in the search, with no limit on gender or socioeconomic status; the scoping review was conducted using a methodological framework from the works of Arskey and O'Malley,[4] Levac and colleagues,[5] and the Joanna Briggs Institute[6] and followed the PRISMA Statement[7] in accordance with the PRISMA-Protocols 2015 checklist;[6] content advisors with extensive food retail health and wellness experience reviewed the initial search plan and provided guidance throughout the scoping review process; and a systematic search of 8 databases was conducted by a systematic review librarian and search terms were adapted according to the database searched.

There were also several limitations that should be noted. Although the search plan was comprehensive, there is a possibility that it did not capture other relevant non–peer-reviewed published works that met the inclusion criteria. In addition, although a content expert was utilized to capture gray literature pertaining to the search criteria, additional data exist on Food as Medicine outcomes within food retail settings; however, the data are considered proprietary and thus are not publicly available. Therefore, the Food as Medicine program models identified from the scoping review do not represent the vast array of programs and outcomes that exist. Finally, only 1 reviewer completed article screening and data extraction. However, the reviewer had extensive experience in retail nutrition and to address this limitation, extreme caution was exercised to ensure consistency in the screening and data extraction process.

CONCLUSIONS

Food as Medicine interventions in the retail setting have the potential to aid consumers in supporting their health through diet and nutrition by encompassing strategic focus areas: food as preventive medicine to promote health and well-being; Food as Medicine in disease management and treatment; and Food as Medicine to improve food and nutrition security. The literature indicates utilizations of multiple intervention categories, such as incentive programs, personalized nutrition education, and path-to-purchase marketing, will produce both health outcomes and improved ROI for the food retailer. Food retailers should take into consideration target population, RDN engagement, and desired focus areas

when developing Food as Medicine interventions. There is also a need for more published research on the impact of nutrition interventions by RDNs in food retail settings to provide further evidence of the important role of RDNs in food retail and the positive impact they have to drive sales of healthy and nutritious products. Utilizing RDN services to implement Food as Medicine interventions in a retail setting will help retailers expand their impact and support the health of the customers, employees, communities, and environments they serve.

References

1. Micha R, Peñalvo JL, Cudhea F, Imamura F, Rehm CD, Mozaffarian D. Association between dietary factors and mortality from heart disease, stroke, and type 2 diabetes in the United States. *JAMA*. 2017;317(9):912-924.
2. Institute of Medicine Committee on Assuring the Health of the Public in the 21st Century. *The Health Care Delivery System*. Washington, DC: National Academies Press; 2002. Accessed January 8, 2020. https://www.ncbi.nlm.nih.gov/books/NBK221227/.
3. Food Marketing Institute. 2019 Report on Retailer Contributions to Health & Wellness. Accessed February 14, 2020, https://www.fmi.org/forms/store/ProductFormPublic/2019-report-on-retailer-contributions-to-health-wellness.
4. Arskey H, O'Malley L. Scoping studies: Towards a methodological framework. *Int J Soc Res Methodol*. 2005;8(1):19-32.
5. Levac D, Colquhoun H, O'Brien KK. Scoping studies: Advancing the methodology. *Implement Sci*. 2010;5(1):69.
6. Peters MDJ, Godfrey C, McInerney P, Munn Z, Tricco AC, Khalil H. Chapter 11: Scoping Reviews. In: Aromataris E, Munn Z, eds. *JBI Manual for Evidence Synthesis*. Adelaide, Australia: Joanna Briggs Institute; 2020. Accessed March 12, 2020. https://wiki.joannabriggs.org/display/MANUAL/Chapter+11%3A+Scoping+reviews.
7. Moher D, Liberati A, Tetzlaff J, Altman DG; PRISMA Group. Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA statement. *PLoS Med*. 2009;6(7). 2009; e1000097.
8. Ouzzani M, Hammady H, Fedorowicz Z, Elmagarmid A. Rayyan—A web and mobile app for systematic reviews. *Syst Rev*. 2016;5(1):210.
9. Wall J, Mhurchu CN, Blakely T, Rodgers A, Wilton J. Effectiveness of monetary incentives in modifying dietary behavior: A review of randomized, controlled trials. *Nutr Rev*. 2006;64(12):518-531.
10. An R. Effectiveness of subsidies in promoting healthy food purchases and consumption: A review of field experiments. *Public Health Nutr*. 2013;16(7):1215-1228.
11. Uricchio A. Tax policies to improve diet and the prevention of noncommunicable diseases. *Acta Paediatr*. 2017;106:9.
12. Gittelsohn J, Trude ACB, Kim H. Pricing strategies to encourage availability, purchase, and consumption of healthy foods and beverages: A systematic review. *Prev Chronic Dis*. 2017;14:E107.
13. von Philipsborn P, Stratil JM, Burns J, et al. Environmental interventions to reduce the consumption of sugar-sweetened beverages and their effects on health. *Cochrane Database Syst Rev*. 2019;6(6):CD012292.
14. Bennett R, Zorbas C, Huse O, Peeters A, Backholer K. A systematic review of the extent and influence of price promotions on consumer purchasing in food and beverage retail settings. *Obes Res Clin Pract*. 2019;13(3):314-315.
15. Roberts S, Pilard L, Chen J, Hirst J, Rutter H, Greenhalgh T. Efficacy of population-wide diabetes and obesity prevention programs: An overview of systematic reviews on proximal, intermediate, and distal outcomes and a meta-analysis of impact on BMI. *Obes Rev*. 2019;20(7):947-963.
16. Gittelsohn J, Rowan M, Gadhoke P. Interventions in small food stores to change the food environment, improve diet, and reduce risk of chronic disease. *Prev Chronic Dis*. 2012;9:E59.
17. van't Riet J. Sales effects of product health information at points of purchase: A systematic review. *Public Health Nutr*. 2013;16(3):418-429.
18. Au N, Marsden G, Mortimer D, Lorgelly PK. The cost-effectiveness of shopping to a predetermined grocery list to reduce overweight and obesity. *Nutr Diabetes*. 2013;3:e77.
19. Liberato SC, Bailie R, Brimblecombe J. Nutrition interventions at point-of-sale to encourage healthier food purchasing: A systematic review. *BMC Public Health*. 2014;14(1):919.
20. Abeykoon AH, Engler-Stringer R, Muhajarine N. Health-related outcomes of new grocery store interventions: A systematic review. *Public Health Nutr*. 2017;20(12):2236-2248.
21. Crockett RA, King SE, Marteau TM, et al. Nutritional labelling for healthier food or non-alcoholic drink purchasing and consumption. *Cochrane Database Syst Rev*. 2018;2(2):CD009315.
22. Hsiao B-S, Sibeko L, Troy LM. A systematic review of mobile produce markets: Facilitators and barriers to use, and associations with reported fruit and vegetable intake. *J Acad Nutr Diet*. 2019;119(1):76-97.e1.
23. Eyles H, Ni Mhurchu C. Does tailoring make a difference? A systematic review of the long-term effectiveness of tailored nutrition education for adults. *Nutr Rev*. 2009;67(8):464-480.
24. Eyles H, Mhurchu CN. Tailored nutrition education: Is it really effective? *Public Health Nutr*. 2012;15(3):561-566.
25. Smith DA, Dill L. Interventions to improve access to fresh food in vulnerable communities: A review of the literature. *Int J Disabil Hum Dev*. 2013;12(4):409-417.
26. Nikolaus CJ, Muzaffar H, Nickols-Richardson SM. Grocery store (or supermarket) tours as an effective nutrition education medium: A systematic review. *J Nutr Educ Behav*. 2016;48(8):544-554.e1.
27. Hartmann-Boyce J, Bianchi F, Piernas C, et al. Grocery store interventions to change food purchasing behaviors: A systematic review of randomized controlled trials. *Am J Clin Nutr*. 2018;107(6):1004-1016.
28. Langellier BA, Garza JR, Prelip ML, Glik D, Brookmeyer R, Ortega AN. Corner store inventories, purchases, and strategies for intervention: A review of the literature. *Calif J Health Promot*. 2013;11(3):1-13.
29. Escaron AL, Meinen AM, Nitzke SA, Martinez-Donate AP. Supermarket and grocery store-based interventions to promote healthful food choices and eating practices: A systematic review. *Prev Chronic Dis*. 2013;10:E50.
30. Cameron AJ, Charlton E, Ngan WW, Sacks G. A systematic review of the effectiveness of supermarket-based interventions involving product, promotion, or place on the healthiness of consumer purchases. *Curr Nutr Rep*. 2016;5(3):129-138.
31. Mayne SL, Auchincloss AH, Michael YL. Impact of policy and built environment changes on obesity-related outcomes: A systematic review of naturally occurring experiments. *Obes Rev*. 2015;16(5):362-375.
32. Adam A, Jensen JD. What is the effectiveness of obesity related interventions at retail grocery stores and supermarkets? A systematic review. *BMC Public Health*. 2016;16(1):1247.
33. Mah Cl, Luongo G, Hasdell R, Taylor Nga, Lo Bk. A systematic review of the effect of retail food environment interventions on diet and health with a focus on the enabling role of public policies. *Curr Nutr Rep*. 2019;8(4):411-428.
34. Buyuktuncer Z, Kearney M, Ryan CL, Thurston M, Ellahi B. Fruit and vegetables on prescription: A brief intervention in primary care. *J Hum Nutr Diet*. 2014;27(suppl 2):186-193.
35. Weinstein E, Galindo RJ, Fried M, Rucker L, Davis NJ. Impact of a focused nutrition educational intervention coupled with improved access to fresh produce on purchasing behavior and consumption of fruits and vegetables in overweight patients with diabetes mellitus. *Diabetes Educ*. 2014;40(1):100-106.
36. Watt TT, Appel L, Lopez V, Flores B, Lawhon B. A primary care-based early childhood nutrition intervention: Evaluation of a pilot program serving low-income Hispanic women. *J Racial Ethn Health Disparities*. 2015;2(4):537-547.
37. Omar J, Alam Z. Fresh prescription program: A program to improve access to

fresh products among underserved patients in downtown Detroit. *J Gen Intern Med*. 2016;1:S879-S880.

38. Brimblecombe J, Ferguson M, Chatfield MD, et al. Effect of a price discount and consumer education strategy on food and beverage purchases in remote Indigenous Australia: A stepped-wedge randomised controlled trial. *Lancet Public Health*. 2017;2(2):e82-e95.
39. Bryce R, Guajardo C, Ilarraza D, et al. Participation in a farmers' market fruit and vegetable prescription program at a federally qualified health center improves hemoglobin A1C in low income uncontrolled diabetics. *Prev Med Rep*. 2017;7:176-179.
40. Banerjee T, Nayak A. Believe it or not: Health education works. *Obes Res Clin Pract*. 2017;12(1):116-124.
41. Leone LA, Haynes-Maslow L, Ammerman AS. Veggie Van pilot study: Impact of a mobile produce market for underserved communities on fruit and vegetable access and intake. *J Hunger Environ Nutr*. 2017;12(1):89-100.
42. Stead M, MacKintosh AM, Findlay A, et al. Impact of a targeted direct marketing price promotion intervention (Buywell) on food-purchasing behaviour by low income consumers: A randomised controlled trial. *J Hum Nutr Diet*. 2017;30(4):524-533.
43. Omar J, Heidemann DL, Blum-Alexandar B, et al. Fresh prescription: Improving nutrition education and access to fresh produce in Detroit. *J Gen Intern Med*. 2017;32(2):S752.
44. Trapl ES, Smith S, Joshi K, et al. Dietary impact of produce prescriptions for patients with hypertension. *Prev Chronic Dis*. 2018;15:E138.
45. Cueva K, Lovato V, Nieto T, Neault N, Barlow A, Speakman K. Increasing healthy food availability, purchasing, and consumption: Lessons learned from implementing a mobile grocery. *Prog Community Health Partnersh*. 2018;12(1):65-72.
46. Gans KM, Risica PM, Keita AD, et al. Multilevel approaches to increase fruit and vegetable intake in low-income housing communities: Final results of the "Live Well, Viva Bien" cluster-randomized trial. *Int J Behav Nutr Phys Act*. 2018;15(1):80.
47. Franckle RL, Levy DE, Macias-Navarro L, Rimm EB, Thorndike AN. Traffic-light labels and financial incentives to reduce sugar-sweetened beverage purchases by low-income Latino families: A randomized controlled trial. *Public Health Nutr*. 2018;21(8):1426-1434.
48. Marcinkevage J, Auvinen A, Nambuthiri S. Washington State's fruit and vegetable prescription program: Improving affordability of healthy foods for low-income patients. *Prev Chronic Dis*. 2019;16:18.
49. Forbes JM, Forbes CR, Lehman E, George DR. "Prevention produce": Integrating medical student mentorship into a fruit and vegetable prescription program for at-risk patients. *Perm J*. 2019;23:18-238.
50. Moran A, Thorndike A, Franckle R, et al. Financial incentives increase purchases of fruit and vegetables among lower-income households with children. *Health Aff (Millwood)*. 2019;38(9):1557-1566.
51. Cook M, McClintic E, Reasoner T, Girard AW, Bookhart L. P85 preliminary evaluation of the 2018 fruit and vegetable prescription program. *J Nutr Educ Behav*. 2019;51(7 suppl):S70-S71.
52. Song HJ, Gittelsohn J, Kim M, Suratkar S, Sharma S, Anliker J. A corner store intervention in a low-income urban community is associated with increased availability and sales of some healthy foods. *Public Health Nutr*. 2009;12(11):2060-2067.
53. Gittelsohn J, Suratkar S, Song HJ, et al. Process evaluation of Baltimore Healthy Stores: A pilot health intervention program with supermarkets and corner stores in Baltimore City. *Health Promot Pract*. 2010;11(5):723-732.
54. Gittelsohn J, Song HJ, Suratkar S, et al. An urban food store intervention positively affects food-related psychosocial variables and food behaviors. *Health Educ Behav*. 2010;37(3):390-402.
55. Abusabha R, Namjoshi D, Klein A. Increasing access and affordability of produce improves perceived consumption of vegetables in low-income seniors. *J Am Diet Assoc*. 2011;111(10):1549-1555.
56. Adams J, Halligan J, Burges Watson D, et al. The Change4Life convenience store programme to increase retail access to fresh fruit and vegetables: A mixed methods process evaluation. *PLoS One*. 2012;7(6). 2012;e39431.
57. Foster GD, Karpyn A, Wojtanowski AC, et al. Placement and promotion strategies to increase sales of healthier products in supermarkets in low-income, ethnically diverse neighborhoods: A randomized controlled trial. *Am J Clin Nutr*. 2014;99(6):1359-1368.
58. Castellanos DC, Christaldi J, Borer K. Using the diffusion of innovations to develop healthy cooking demonstrations at a farmers' market. *J Hunger Environ Nutr*. 2014;9(4):471-484.
59. Lawman HG, Vander Veur S, Mallya G, et al. Changes in quantity, spending, and nutritional characteristics of adult, adolescent and child urban corner store purchases after an environmental intervention. *Prev Med*. 2015;74:81-85.
60. Gamburzew A, Darcel N, Gazan R, et al. In-store marketing of inexpensive foods with good nutritional quality in disadvantaged neighborhoods: Increased awareness, understanding, and purchasing. *Int J Behav Nutr Phys Act*. 2016;13(1):104.
61. Albert SL, Langellier BA, Sharif MZ, et al. A corner store intervention to improve access to fruits and vegetables in two Latino communities. *Public Health Nutr*. 2017;20(12):2249-2259.
62. Woodward-Lopez G, Kao J, Kuo ES, et al. Changes in consumer purchases in stores participating in an obesity prevention initiative. *Am J Prev Med*. 2018;54(5):S160-S169.
63. Sutton K, Caldwell J, Yoshida S, Thompson J, Kuo T. Healthy food marketing and purchases of fruits and vegetables in large grocery stores. *Prev Med Rep*. 2019;14:100861.
64. Johnson DB, Beaudoin S, Smith LT, Beresford SA, LoGerfo JP. Increasing fruit and vegetable intake in homebound elders: The Seattle Senior Farmers' Market Nutrition Pilot Program. *Prev Chronic Dis*. 2004;1(1):A03.
65. Ball K, McNaughton SA, Le HN, Abbott G, Stephens LD, Crawford DA. ShopSmart 4 Health: Results of a randomized controlled trial of a behavioral intervention promoting fruit and vegetable consumption among socioeconomically disadvantaged women. *Am J Clin Nutr*. 2016;104(2):436-445.
66. Hoechster R, Palm C, Pleasant A, et al. Conducting effective grocery store tours to improve shopping behaviors, health outcomes, and health literacy. *J Acad Nutr Diet*. 2016;116(9). A14-A14.
67. Haddad AK, Lewis AH, Bergeron NQ, et al. Evaluating the effectiveness of a healthy food shopping tour in low-income African-American neighborhoods in Chicago. *J Gen Intern Med*. 2017;32:S183-S184.
68. Kunkel ME, Luccia B, Moore AC. Evaluation of the South Carolina seniors farmers' market nutrition education program. *J Am Diet Assoc*. 2003;103(7):880-883.
69. Lindsay S, Lambert J, Penn T, et al. Monetary matched incentives to encourage the purchase of fresh fruits and vegetables at farmers markets in underserved communities. *Prev Chronic Dis*. 2013;10:E188.
70. Smith C, Parnell WR, Brown RC, Gray AR. Providing additional money to food-insecure households and its effect on food expenditure: A randomized controlled trial. *Public Health Nutr*. 2013;16(8):1507-1515.
71. Phipps EJ, Braitman LE, Stites SD, Wallace SL, Singletary SB, Hunt LH. The use of financial incentives to increase fresh fruit and vegetable purchases in lower-income households: Results of a pilot study. *J Health Care Poor Underserved*. 2013;24(2):864-874.
72. Freedman DA, Choi SK, Hurley T, Anadu E, Hebert JR. A farmers' market at a federally qualified health center improves fruit and vegetable intake among low-income diabetics. *Prev Med*. 2013;56(5):288-292.
73. Phipps EJ, Braitman LE, Stites SD, et al. Impact of a rewards-based incentive program on promoting fruit and vegetable purchases. *Am J Public Health*. 2015;105(1):166-172.
74. Harnack L, Oakes JM, Elbel B, Beatty T, Rydell S, French S. Effects of subsidies and prohibitions on nutrition in a food benefit program: A randomized clinical trial. *JAMA Intern Med*. 2016;176(11):1610-1618.
75. French SA, Rydell SA, Mitchell NR, Michael Oakes J, Elbel B, Harnack L. Financial incentives and purchase

restrictions in a food benefit program affect the types of foods and beverages purchased: Results from a randomized trial. *Int J Behav Nutr Phys Act*. 2017;14(1):127.

76. Ferguson M, O'Dea K, Holden S, Miles E, Brimblecombe J. Food and beverage price discounts to improve health in remote Aboriginal communities: Mixed method evaluation of a natural experiment. *Aust N Z J Public Health*. 2017;41(1):32-37.
77. Pellegrino S, Bost A, McGonigle M, et al. Fruit and vegetable intake among participants in a District of Columbia farmers' market incentive programme. *Public Health Nutr*. 2018;21(3):601-606.
78. Jennings L, Marpadga S, Bonini C, Akers M, Levi R, Long K. The impact of a community fruit and vegetable voucher program (Vouchers 4 Veggies) on improvements in dietary intake and food security (P04-013-19). *Curr Dev Nutr*. 2019;3(suppl 1).
79. Basu S, Gardner CD, White JS, et al. Effects of alternative food voucher delivery strategies on nutrition among low-income adults. *Health Aff (Millwood)*. 2019;38(4):577-584.
80. Dannefer R, Abrami A, Rapoport R, Sriphanlop P, Sacks R, Johns M. A mixed-methods evaluation of a SNAP-Ed farmers' market-based nutrition education program. *J Nutr Educ Behav*. 2015;47(6):516-525.e1.
81. Segura-Perez S, Perez-Escamilla R, Damio G. Improving access to fresh fruit and vegetables among inner-city residents: The NEAT trial. Presented at: Experimental Biology; April 2017; Chicago, IL.
82. Cohen AJ, Richardson CR, Heisler M, et al. Increasing use of a healthy food incentive: A waiting room intervention among low-income patients. *Am J Prev Med*. 2017;52(2):154-162.
83. Walkinshaw LP, Quinn EL, Rocha A, Johnson DB. An evaluation of Washington state SNAP-Ed farmers' market initiatives and SNAP participant behaviors. *J Nutr Educ Behav*. 2018;50(6):536-546.
84. DeWitt E, McGladrey M, Liu E, et al. A community-based marketing campaign at farmers markets to encourage fruit and vegetable purchases in rural counties with high rates of obesity, Kentucky, 2015-2016. *Prev Chronic Dis*. 2017;14:E72.
85. Payne C, Niculescu M. Can healthy checkout end-caps improve targeted fruit and vegetable purchases? Evidence from grocery and SNAP participant purchases. *Food Policy*. 2018;79:318-323.
86. Moran AJ, Khandpur N, Polacsek M, et al. Make It Fresh, for Less! a supermarket meal bundling and electronic reminder intervention to promote healthy purchases among families with children. *J Nutr Educ Behav*. 2019;51(4):400-408.
87. Wilkin M, Wolford B, Carmody M, Franck KL, Sneed CT, Walker B. P54 Outcome evaluation of the University of Tennessee Extension Farmers' Market Fresh Nutrition Education Program. *J Nutr Educ Behav*. 2019;51(7 suppl):S56-S57.
88. Baronberg S, Dunn L, Nonas C, Dannefer R, Sacks R. The impact of New York City's Health Bucks Program on electronic benefit transfer spending at farmers markets, 2006-2009. *Prev Chronic Dis*. 2013;10:E163.
89. Young CR, Aquilante JL, Solomon S, et al. Improving fruit and vegetable consumption among low-income customers at farmers markets: Philly Food Bucks, Philadelphia, Pennsylvania, 2011. *Prev Chronic Dis*. 2013;10:E166.
90. Dimitri C, Oberholtzer L. Potential national economic benefits of the Food Insecurity and Nutrition Incentives Program of the US Agricultural Act of 2014. *J Agric Food Syst Community Dev*. 2015;5(4):49-61.
91. An R. Nationwide expansion of a financial incentive program on fruit and vegetable purchases among Supplemental Nutrition Assistance Program participants: A cost-effectiveness analysis. *Soc Sci Med*. 2015;147:80-88.
92. Savoie-Roskos M, Durward C, Jeweks M, LeBlanc H. Reducing food insecurity and improving fruit and vegetable intake among farmers' market incentive program participants. *J Nutr Educ Behav*. 2016;48(1):70-76.e1.
93. Steele-Adjognon M, Weatherspoon D. Double Up Food Bucks program effects on SNAP recipients' fruit and vegetable purchases. *BMC Public Health*. 2017;17(1):946.
94. Mozaffarian D, Liu J, Sy S, et al. Cost-effectiveness of financial incentives and disincentives for improving food purchases and health through the US Supplemental Nutrition Assistance Program (SNAP): A microsimulation study. *PLoS Med*. 2018;15(10):e1002661.
95. Jithitikulchai T, Andreyeva T. Sugar-sweetened beverage demand and tax simulation for federal food assistance participants: A case of two New England states. *Appl Health Econ Health Policy*. 2018;16(4):549-558.
96. Polacsek M, Moran A, Thorndike AN, et al. A supermarket double-dollar incentive program increases purchases of fresh fruits and vegetables among low-income families with children: The Healthy Double Study. *J Nutr Educ Behav*. 2018;50(3):217-228.e1.
97. Durward CM, Savoie-Roskos M, Atoloye A, et al. Double Up Food Bucks participation is associated with increased fruit and vegetable consumption and food security among low-income adults. *J Nutr Educ Behav*. 2019;51(3):342-347.
98. Ferdinand R, Torres R, Scott J, Saeed I, Scribner R. Incentivizing fruit and vegetable purchasers at fresh markets in lower 9th ward, New Orleans. *Ethn Dis*. 2017;27(suppl 1):287-294.
99. Bradford VA, Quinn EL, Walkinshaw LP, et al. Fruit and vegetable access programs and consumption in low-income communities. *J Hunger Environ Nutr*. 2019;14(6):780-795.
100. Anderson JV, Bybee DI, Brown RM, et al. 5 A Day fruit and vegetable intervention improves consumption in a low income population. *J Am Diet Assoc*. 2001;101(2):195-202.
101. Thorndike AN, Bright OM, Dimond MA, Fishman R, Levy DE. Choice architecture to promote fruit and vegetable purchases by families participating in the Special Supplemental Program for Women, Infants, and Children (WIC): Randomized corner store pilot study. *Public Health Nutr*. 2017;20(7):1297-1305.
102. Wensel CR, Trude ACB, Poirier L, et al. B'More healthy corner stores for moms and kids: Identifying optimal behavioral economic strategies to increase WIC redemptions in small urban corner stores. *Int J Environ Res Public Health*. 2019;16(1):64.
103. Herman DR, Harrison GG, Jenks E. Choices made by low-income women provided with an economic supplement for fresh fruit and vegetable purchase. *J Am Diet Assoc*. 2006;106(5):740-744.
104. Herman DR, Harrison GG, Afifi AA, Jenks E. Effect of a targeted subsidy on intake of fruits and vegetables among low-income women in the Special Supplemental Nutrition Program for Women, Infants, and Children. *Am J Public Health*. 2008;98(1):98-105.
105. Racine EF, Vaughn A. A pilot study to examine the impact of the farmers' market Nutrition Program. *FASEB J*. 2009;23.
106. Freedman DA, Mattison-Faye A, Alia K, Guest MA, Hebert JR. Comparing farmers' market revenue trends before and after the implementation of a monetary incentive for recipients of food assistance. *Prev Chronic Dis*. 2014;11:E87.
107. Andreyeva T, Luedicke J. Incentivizing fruit and vegetable purchases among participants in the Special Supplemental Nutrition Program for Women, Infants, and Children. *Public Health Nutr*. 2015;18(1):33-41.
108. Stallings TL, Gazmararian JA, Goodman M, Kleinbaum D. The Georgia WIC Farmers' market nutrition program's influence on fruit and vegetable intake and nutrition knowledge and competencies among urban African American women and children. *J Hunger Environ Nutr*. 2016;11(1):86-101.
109. Griffith R, von Hinke S, Smith S. Getting a healthy start: The effectiveness of targeted benefits for improving dietary choices. *J Health Econ*. 2018;58:176-187.
110. Hui-Callahan BC, Luder HR, Frede SM. Impact of the pay-for-performance-for-patients program for diabetes management. *J Am Pharm Assoc (2003)*. 2013;53(6):644-647.
111. Dasgupta K, Joseph L, Da Costa D, Pilote L, Christopoulos S, Gougeon R. Pilot study demonstrates promise for dietary counseling-cooking lesson

intervention in type 2 diabetes. *Can J Diabetes*. 2009;33(3):P270.

112. Kirkland F, Pearson N, Roe T, Butlerw G, Burton C, Baker L. The MUNCH: An educational programme "Making Useful Nutritional Choices for Health" brings about positive changes in behaviour. *Diabet Med*. 2009;26(1):166.
113. Twigg G, Motsko J, Sherr J. An interdisciplinary approach to increase billable patient care opportunities in a rural community pharmacy resulting in positive patient outcomes. *J Am Pharm Assoc*. 2016;56:e93-e94.
114. Millan-Ferro A, Grzegorczyk TM, Gonzalez M. An unconventional approach to nutrition management. *Diabetes*. 2017;66(suppl 1):A203.
115. Cloutier S, Kalista T, Capoccia K. Implementing an accredited diabetes education program in a grocery store community pharmacy. *J Am Pharm Assoc*. 2018;58:e34.
116. Cao J, Li Y, Wang W, et al. Pharmacist-led digital care improved community diabetes control in China—An observational study in a large population sample. *Diabetes*. 2018;67(suppl 1):A351.
117. Dasgupta K, Hajna S, Gougeon R. Impact of a cooking lesson-dietary education strategy on weight loss in overweight adults with type 2 diabetes. *Obesity*. 2011;1:S113.
118. Kellow N. Evaluation of a rural community pharmacy-based Waist Management Project: Bringing the program to the people. *Aust J Prim Health*. 2011;17(1):16-22.
119. Palacios C, Torres M, Lopez D, Trak-Fellermeier MA, Coccia C, Perez CM. Effectiveness of the nutritional app "MyNutriCart" on food choices related to purchase and dietary behavior: A pilot randomized controlled trial. *Nutrients*. 2018;10(12):12.
120. Geliebter A, Ang IYH, Bernales-Korins M, et al. Supermarket discounts of low-energy density foods: Effects on purchasing, food intake, and body weight. *Obesity*. 2013;21(12):E542-E548.
121. Bernales-Korins M, Ang IYH, Khan S, Geliebter A. Psychosocial influences on fruit and vegetable intake following a NYC supermarket discount. *Obesity*. 2017;25(8):1321-1328.
122. Watowicz RP, Wexler RK, Weiss R, Anderson SE, Darragh AR, Taylor CA. Nutrition counseling for hypertension within a grocery store: An example of the patient-centered medical neighborhood model. *J Nutr Educ Behav*. 2019;51(2):129-137.e1.
123. Miller ER 3rd, Cooper LA, Carson KA, et al. A dietary intervention in Urban African Americans: Results of the "Five Plus Nuts and Beans" randomized trial. *Am J Prev Med*. 2016;50(1):87-95.
124. Betty AL. Using financial incentives to increase fruit and vegetable consumption in the UK. *Nutr Bull*. 2013;38(4):414-420.
125. An R, Patel D, Segal D, Sturm R. Eating better for less: A national discount program for healthy food purchases in South Africa. *Am J Health Behav*. 2013;37(1):56-61.
126. Hanks A, Just D, Wansink B. Evaluating the impact of fat taxes and vegetables subsidies on specific food categories. *FASEB J*. 2014;28(1).
127. Magnus A, Moodie ML, Ferguson M, Cobiac LJ, Liberato SC, Brimblecombe J. The economic feasibility of price discounts to improve diet in Australian Aboriginal remote communities. *Aust N Z J Public Health*. 2016;40(suppl 1):S36-S41.
128. Loubser M, Noach A, Nossel C, Patel DN, Lambert V. HealthyFood™ benefit: Impact of financial incentives and rewards on health and purchasing behaviour of members of a private health insurance scheme in South Africa. *South Afr J Clin Nutr*. 2010;2:S28.
129. Sturm R, An R, Segal D, Patel D. A cash-back rebate program for healthy food purchases in South Africa: Results from scanner data. *Am J Prev Med*. 2013;44(6):567-572.
130. Smith-Drelich N. Buying health: Assessing the impact of a consumer-side vegetable subsidy on purchasing, consumption and waste. *Public Health Nutr*. 2016;19(3):520-529.
131. Kral TV, Bannon AL, Moore RH. Effects of financial incentives for the purchase of healthy groceries on dietary intake and weight outcomes among older adults: A randomized pilot study. *Appetite*. 2016;100:110-117.
132. An R, Sturm R. A cash-back rebate program for healthy food purchases in South Africa: Selection and program effects in self-reported diet patterns. *Am J Health Behav*. 2017;41(2):152-162.
133. Colchero M, Popkin BM, Rivera JA, Ng SW. Beverage purchases from stores in Mexico under the excise tax on sugar sweetened beverages: Observational study. *BMJ*. 2016;352:h6704.
134. Silver LD, Ng SW, Ryan-Ibarra S, et al. Changes in prices, sales, consumer spending, and beverage consumption one year after a tax on sugar-sweetened beverages in Berkeley, California, US: A before-and-after study. *PLoS Med*. 2017;14(4):e1002283.
135. Smith Tallie L, Corvalan C, Reyes M, Silva A, Caro C, Popkin BM. Chile: Impact of the SSB tax. *Ann Nutr Metab*. 2017;71:82.
136. Alvarado M, Unwin N, Sharp SJ, et al. Assessing the impact of the Barbados sugar-sweetened beverage tax on beverage sales: An observational study. *Int J Behav Nutr Phys Act*. 2019;16(1):13.
137. Giesen J, Havermans RC, Nederkoorn C, Jansen A. Impulsivity in the supermarket. Responses to calorie taxes and subsidies in healthy weight undergraduates. *Appetite*. 2012;58(1):6-10.
138. Berkowitz SA, Terranova J, Randall L, Cranston K, Waters DB, Hsu J. Association between receipt of a medically tailored meal program and health care use. *JAMA Intern Med*. 2019;179(6):786-793.
139. Food Is Medicine Model. Accessed February 17, 2020, https://hpplans.lpages.co/foodismedicine/.
140. Kurtzman L. Food is medicine for HIV-positive and type 2 diabetes patients: Study finds good nutrition improves medication adherence and mental health. University of California San Francisco. Accessed February 17, 2020, https://www.ucsf.edu/news/2017/01/405651/food-medicine-hiv-positive-and-type-2-diabetes-patients.
141. Berkowitz SA, Delahanty LM, Terranova J, et al. Medically tailored meal delivery for diabetes patients with food insecurity: A randomized cross-over trial. *J Gen Intern Med*. 2019;34(3):396-404.
142. Berkowitz SA, Terranova J, Hill C, et al. Meal delivery programs reduce the use of costly health care in dually eligible Medicare and Medicaid beneficiaries. *Health Aff (Millwood)*. 2018;37(4):535-542.
143. Palar K, Napoles T, Hufstedler LL, et al. Comprehensive and medically appropriate food support is associated with improved HIV and diabetes health. *J Urban Health Bull N Y Acad Med*. 2017;94(1):87-99.
144. Gurvey J, Rand K, Daugherty S, Dinger C, Schmeling J, Laverty N. Examining health care costs among MANNA clients and a comparison group. *J Prim Care Community Health*. 2013;4(4):311-317.
145. Seligman HK, Lyles C, Marshall MB, et al. A pilot food bank intervention featuring diabetes-appropriate food improved glycemic control among clients in three states. *Health Aff (Millwood)*. 2015;34(11):1956-1963.
146. Russo J, Staelin R, Nolan CA, Russell GJ, Metcalf BL. Nutrition information in the supermarket. *J Consum Res*. 1986;13(1):48-70.
147. Achabal DD, McIntyre SH, Bell CH, Tucker N. The effect of nutrition P-O-P signs on consumer attitudes and behavior. *J Retail*. 1987;63(1):9-24.
148. Hunt MK, Lefebvre RC, Hixson ML, Banspach SW, Assaf AR, Carleton RA. Pawtucket Heart Health Program point-of-purchase nutrition education program in supermarkets. *Am J Public Health*. 1990;80(6):730-732.
149. Sacks G, Rayner M, Swinburn B. Impact of front-of-pack "traffic-light" nutrition labelling on consumer food purchases in the UK. *Health Promot Int*. 2009;24(4):344-352.
150. Sutherland LA, Kaley LA, Fischer L. Guiding stars: The effect of a nutrition navigation program on consumer purchases at the supermarket. *Am J Clin Nutr*. 2010;91(4):1090S-1094S.
151. Ogawa Y, Tanabe N, Honda A, et al. Point-of-purchase health information encourages customers to purchase vegetables: Objective analysis by using a point-of-sales system. *Environ Health Prev Med*. 2011;16(4):239-246.
152. Sacks G, Tikellis K, Millar L, Swinburn B. Impact of "traffic-light" nutrition information on online food purchases in Australia. *Aust N Z J Public Health*. 2011;35(2):122-126.
153. Freedman MR, Connors R. Point-of-purchase nutrition information influences

food-purchasing behaviors of college students: A pilot study. *J Am Diet Assoc*. 2011;111(5):S42-S46.

154. Cawley J, Sweeney MJ, Sobal J, et al. The impact of a supermarket nutrition rating system on purchases of nutritious and less nutritious foods. *Public Health Nutr*. 2015;18(1):8-14.

155. Nikolova HD, Inman J. Healthy choice: The effect of simplified point-of-sale nutritional information on consumer food choice behavior. *J Mark Res*. 2015;52(6):817-835.

156. Ni Mhurchu C, Volkova E, Eyles H, Sacks G, Cleghorn C, Scarborough P. Estimated effects of health star rating front-of-pack nutrition labels on mortality from diet-related disease in New Zealand. *Obes Rev*. 2016;2:191.

157. Payne CR, Niculescu M, Just DR, Kelly MP. This way to produce: Strategic use of arrows on grocery floors facilitate produce spending without increasing shopper budgets. *J Nutr Educ Behav*. 2016;48(7):512-513.e1.

158. Mork T, Grunert KG, Fenger M, Juhl HJ, Tsalis G. An analysis of the effects of a campaign supporting use of a health symbol on food sales and shopping behaviour of consumers. *BMC Public Health*. 2017;17(1):239.

159. Smed S, Jansen L, Edenbrandt A. The impact on food purchases of the Dutch choices and the Danish keyhole FOP systems. *Ann Nutr Metab*. 2017;71:100.

160. Rayner M, Harrington R, Scarborough P. The impact of the UK traffic-light labelling system on diets. *Ann Nutr Metab*. 2017;71:101-102.

161. Ni Mhurchu C, Volkova E, Jiang Y, et al. Effects of interpretive nutrition labels on consumer food purchases: The Starlight randomized controlled trial. *Am J Clin Nutr*. 2017;105(3):695-704.

162. Hobin E, Bollinger B, Sacco J, et al. Consumers' response to an on-shelf nutrition labelling system in supermarkets: Evidence to inform policy and practice. *Milbank Q*. 2017;95(3):494-534.

163. Ni Mhurchu C, Eyles H, Jiang Y, Blakely T. Do nutrition labels influence healthier food choices? Analysis of label viewing behaviour and subsequent food purchases in a labelling intervention trial. *Appetite*. 2018;121:360-365.

164. Finkelstein EA, Li W, Melo G, Strombotne K, Zhen C. Identifying the effect of shelf nutrition labels on consumer purchases: Results of a natural experiment and consumer survey. *Am J Clin Nutr*. 2018;107(4):647-651.

165. Chapman LE, Sadeghzadeh C, Koutlas M, Zimmer C, De Marco M. Evaluation of three behavioural economics "nudges" on grocery and convenience store sales of promoted nutritious foods. *Public Health Nutr*. 2019;22(17):3250-3260.

166. Melo G, Zhen C, Colson G. Does point-of-sale nutrition information improve the nutritional quality of food choices? *Econ Hum Biol*. 2019;35:133-143.

167. Worsley A, McConnon S. Evaluation of the New Zealand Heart Food Festival 1988-9. *Health Promot Int*. 1990;5(2):127-135.

168. Minaker LM, Olstad DL, MacKenzie G, et al. An evaluation of the impact of a restrictive retail food environment intervention in a rural community pharmacy setting. *BMC Public Health*. 2016;16:586.

169. Winkler LL, Christensen U, Glumer C, et al. Substituting sugar confectionery with fruit and healthy snacks at checkout—A win-win strategy for consumers and food stores? A study on consumer attitudes and sales effects of a healthy supermarket intervention. *BMC Public Health*. 2016;16(1):1184.

170. Jilcott Pitts SB, Wu Q, Truesdale KP, et al. One-year follow-up examination of the impact of the North Carolina healthy food small retailer program on healthy food availability, purchases, and consumption. *Int J Environ Res*. 2018;15(12):28.

171. Bird Jernigan VB, Salvatore AL, Williams M, et al. A Healthy Retail Intervention in Native American Convenience Stores: The THRIVE Community-Based Participatory Research Study. *Am J Public Health*. 2019;109(1):132-139.

172. Walmsley R, Jenkinson D, Saunders I, Howard T, Oyebode O. Choice architecture modifies fruit and vegetable purchasing in a university campus grocery store: Time series modelling of a natural experiment. *BMC Public Health*. 2018;18(1):1149.

173. Koutoukidis DA, Jebb SA, Ordonez-Mena JM, et al. Prominent positioning and food swaps are effective interventions to reduce the saturated fat content of the shopping basket in an experimental online supermarket: A randomized controlled trial. *Int J Behav Nutr Phys Act*. 2019;16(1):50.

174. Levy AS, Stokes RC. Effects of a health promotion advertising campaign on sales of ready-to-eat cereals. *Public Health Rep*. 1987;102(4):398-403.

175. Patterson BH, Kessler LG, Wax Y, et al. Evaluation of a supermarket intervention: The NCI-Giant Food Eat for Health study. *Eval Rev*. 1992;16(5):464-490.

176. Cotugna N, Vickery CE. Development and supermarket field testing of videotaped nutrition messages for cancer risk reduction. *Public Health Rep*. 1992;107(6):691-694.

177. Reger B, Wootan MG, Booth-Butterfield S, Smith H. 1% or less: A community-based nutrition campaign. *Public Health Rep*. 1998;113(5):410-419.

178. Reger B, Wootan MG, Booth-Butterfield S. Using mass media to promote healthy eating: A community-based demonstration project. *Prev Med*. 1999;29(5):414-421.

179. Connell D, Goldberg JP, Folta SC. An intervention to increase fruit and vegetable consumption using audio communications: In-store public service announcements and audiotapes. *J Health Commun*. 2001;6(1):31-43.

180. Wrieden WL, Levy LB. "Change4Life Smart Swaps": Quasi-experimental evaluation of a natural experiment. *Public Health Nutr*. 2016;19(13):2388-2392.

181. Dwivedi G, Harvey J, St. John L, Close A. Taste-test booth: An innovative tool in health promotion. *J Can Diet Assoc*. 1997;58(2):90-93.

182. Gustafson A, Ng SW, Jilcott Pitts S. The association between the "Plate it Up Kentucky" supermarket intervention and changes in grocery shopping practices among rural residents. *Transl Behav Med*. 2019;9(5):865-874.

183. Olstad DL, Crawford DA, Abbott G, et al. The impact of financial incentives on participants' food purchasing patterns in a supermarket-based randomized controlled trial. *Int J Behav Nutr Phys Act*. 2017;14(1):115.

184. Silzer JS, Sheeshka J, Tomasik HH, Woolcott DM. An evaluation of supermarket safari nutrition education tours. *J Can Diet Assoc*. 1994;55(4):179-183.

185. Condrasky MD, Frost S, Lee A, Simmons S, Hrabski T. What's cooking? A culinary nutrition research program with dietetic interns. *Top Clin Nutr*. 2010;25(3):280-288.

186. Bangia D, Palmer-Keenan DM. Grocery store podcast about omega-3 fatty acids influences shopping behaviors: A pilot study. *J Nutr Educ Behav*. 2014;46(6):616-620.

187. Morgan R, Seman L, Wolford B. Understanding the impact of store-based nutrition education on food purchasing behavior: Findings from analysis of participant grocery receipts. *J Acad Nutr Diet*. 2014;114(9). A79-A79.

188. Schultz J, Litchfield R. Evaluation of Traditional and technology-based grocery store nutrition education. *Am J Health Educ*. 2016;47(6):355-364.

189. Bangia D, Shaffner DW, Palmer-Keenan DM. A point-of-purchase intervention using grocery store tour podcasts about omega-3s increases long-term purchases of omega-3-rich food items. *J Nutr Educ Behav*. 2017;49(6):475-480.e1.

190. Huang A, Barzi F, Huxley R, et al. The effects on saturated fat purchases of providing internet shoppers with purchase—Specific dietary advice: A randomised trial. *PLoS Clin Trials*. 2006;1(5):e22.

191. O'Connor C, Gilliland J, Sadler R, Clark A, Milczarek M, Doherty S. Smartphone based program for improving food literacy and healthy eating. *Can J Diet Pract Res*. 2015;76(3). e14-e14.

192. Amaro H, Cortes DE, Garcia S, Duan L, Black DS. Video-based grocery shopping intervention effect on purchasing behaviors among Latina shoppers. *Am J Public Health*. 2017;107(5):800-806.

193. Light EM, Kline AS, Drosky MA, Chapman LS. Economic analysis of the return-on-investment of a worksite wellness program for a large multistate retail grocery organization. *J Occup Environ Med*. 2015;57(8):882-892.

194. Strychar IM, Potvin L, Pineault R, Pineau R, Prevost D. Changes in knowledge and food behaviour following—A screening program held in a supermarket. *Can J Public Health Rev*. 1993;84(6):382-388.

195. Sando K, Harrell JG. Justification for implementation of a pharmacist-managed Medicare annual wellness visit clinic. *Pharmacotherapy*. 2014;34:e232.

196. Winett RA, Moore JF, Wagner JL, et al. Altering shoppers supermarket purchases to fit nutritional guidelines—An interactive information-system. *J Appl Behav Anal*. 1991;24(1):95-105.

197. Le HN, Gold L, Abbott G, et al. Economic evaluation of price discounts and skill-building strategies on purchase and consumption of healthy food and beverages: The SHELf randomized controlled trial. *Soc Sci Med*. 2016;159:83-91.

198. Olstad DLO, Ball K, Abbott G, et al. Applying the RE-AIM framework to evaluate the supermarket healthy eating for life (SHELf) randomized controlled trial. *Obes Rev*. 2016;2:164.

199. Jue JJ, Press MJ, McDonald D, et al. The impact of price discounts and calorie messaging on beverage consumption: A multi-site field study. *Prev Med*. 2012;55(6):629-633.

200. Toft U, Winkler LL, Eriksson F, Mikkelsen BE, Bloch P, Glumer C. The effect of 20% discount on fruit and vegetables for three months on supermarket purchases. *Ann Nutr Metab*. 2015;1:382-383.

201. Fox HM, Shields C. Effect of leaflets vs food samples on food purchasing. *J Am Diet Assoc*. 1980;77(6):692-694.

202. Paine-Andrews A, Francisco VT, Fawcett SB, Johnston J, Coen S. Health marketing in the supermarket: Using prompting, product sampling, and price reduction to increase customer purchases of lower-fat items. *Health Mark Q*. 1996;14(2):85-99.

203. Kristal AR, Goldenhar L, Muldoon J, Morton RF. Evaluation of a supermarket intervention to increase consumption of fruits and vegetables. *Am J Health Promot*. 1997;11(6):422-425.

204. Winett RA, Anderson ES, Bickley PG, et al. Nutrition for a Lifetime System(c): A multimedia system for altering food supermarket shoppers' purchases to meet nutritional guidelines. *Comput Hum Behav*. 1997;13(3):371-392.

205. Anderson ES, Winett RA, Bickley PG, et al. The effects of a multimedia system in supermarkets to alter shoppers' food purchases: Nutritional outcomes and caveats. *J Health Psychol*. 1997;2(2):209-223.

206. Milliron BJ, Woolf K, Appelhans BM. A point-of-purchase intervention featuring in-person supermarket education affects healthful food purchases. *J Nutr Educ Behav*. 2012;44(3):225-232.

207. Elbel B, Taksler GB, Mijanovich T, Abrams CB, Dixon LB. Promotion of healthy eating through public policy: A controlled experiment. *Am J Prev Med*. 2013;45(1):49-55.

208. Waterlander WE, de Boer MR, Schuit AJ, Seidell JC, Steenhuis IH. Price discounts significantly enhance fruit and vegetable purchases when combined with nutrition education: A randomized controlled supermarket trial. *Am J Clin Nutr*. 2013;97(4):886-895.

209. Lambert EV, Kolbe-Alexander TL. Innovative strategies targeting obesity and non-communicable diseases in South Africa: What can we learn from the private healthcare sector? *Obes Rev*. 2013;14(suppl 2):141-149.

210. Gittelsohn J, Kim EM, He S, Pardilla M. A food store-based environmental intervention is associated with reduced BMI and improved psychosocial factors and food-related behaviors on the Navajo nation. *J Nutr*. 2013;143(9):1494-1500.

211. Ball K, McNaughton SA, Le HN, et al. Influence of price discounts and skill-building strategies on purchase and consumption of healthy food and beverages: Outcomes of the Supermarket Healthy Eating for Life randomized controlled trial. *Am J Clin Nutr*. 2015;101(5):1055-1064.

212. Schwartz MB, Schneider GE, Li X, et al. Retail soda purchases decrease after two years of a community campaign promoting better beverage choices. *Circulation*. 2016;134:A15749.

213. Ponce J, Ramos-Martin J. Impact of two policy interventions on dietary diversity in Ecuador. *Public Health Nutr*. 2017;20(8):1473-1480.

214. Glanz K, Hersey J, Cates S, et al. Effect of a nutrient rich foods consumer education program: Results from the nutrition advice study. *J Acad Nutr Diet*. 2012;112(1):56-63.

215. Rushakoff JA, Zoughbie DE, Bui N, DeVito K, Makarechi L, Kubo H. Evaluation of Healthy2Go: A country store transformation project to improve the food environment and consumer choices in Appalachian Kentucky. *Prev Med Rep*. 2017;7:187-192.

216. Alakaam A. A nutrition education program through the farmer's market: Lessons learned from community-based research in North Dakota. *Circulation*. 2019;139:AP093.

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AUTHOR CONTRIBUTIONS

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Construct	Keywords
Setting	Grocery store, food store, food outlet, corner store, supermarket, grocer, retailer, online retailer, online store, community store, co-op, drug store, convenience store
Interventions	Related terms Nutrition/diet/health/eating well—promotion, intervention, program, initiative, practice, marketing, service Retail nutrition/dietitian Personalized nutrition—nutrition education, nutrition resources, medical nutrition therapy, MNT, nutrition counseling, telehealth, store tours, cooking class, health screen, biometric screen Point of purchase, point of sale, marketing, education—signage, displays, food demonstrations, media/TV promotions, health app, online health, store ad/circular Food is medicine Medically tailored nutrition—food/meals Prescription/voucher program Incentive program—incentives, restrictions, disincentives
Behavior changes	Behavior change (awareness, knowledge, skills) Availability, affordability, consumer demand, accessibility
Outcomes	Food purchasing, increased sales, increased intake of healthy food (produce, fruit, vegetable, whole grains, low-fat dairy, nuts, seeds, plant oils), eating well, improved health outcome
Cost–benefit analysis	• Related terms: ○ ROI, return on investment • Compensation: ○ Direct revenue: increased sales/profit, fee-for-service ○ Monetary incentive: sponsor(ship) • Health care reimbursement: ○ Reimbursement: dietitian/RDN, pharmacy/Rx, Insurance reimbursement • Health care: reduced/improved employer health care costs/fees

Figure 2. Keywords used in the search strategy.

Criteria	Inclusion criteria	Exclusion criteria
Population (and age)	18 years or older Stores/supermarkets aimed at general populations and organizations that provide monetary incentives and/or sponsorship to food stores	Individuals younger than 18 years Individuals diagnosed with disease states resulting in malnutrition (eg, cancer, human immunodeficiency virus/acquired immunodeficiency syndrome, malaria, cystic fibrosis), animals, nonsupermarket/store settings (eg, cafeterias, restaurants, fast food, vending machines, and hospital)
Study design	Randomized controlled trial Nonrandomized controlled trial, Observational studies, Conference proceedings	Newspaper articles, editorials
Intervention	Aimed to increase awareness, knowledge and/or skills of food purchasing decisions and/or to impact	Nonfood interventions (tobacco cessation, alcohol, drugs, mental health, supplements, exercise, sports)

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Figure 3. Inclusion and exclusion criteria.

Criteria	Inclusion criteria	Exclusion criteria
	consumer demand, accessibility and/or affordability to choose healthier foods and drinks (through personalized nutrition services, point-of-purchase	Services outside the scope of practice of a registered dietitian nutritionist (immunizations, vaccinations, medication, medication therapy management, drug interactions) Food safety Genetically modified foods Country of origin and organic labeling Additional retail terms
	Marketing and education, medically tailored nutrition programs, prescription/voucher programs, incentive programs)	Deemed not applicable (theft, fraud, music, lighting, shopping/buying patterns and pathways, shopping carts, gas, vehicles)
Comparison	No intervention	
Outcomes	Increased sales/purchase of healthy foods, increased intake of healthy foods, improved health outcomes	
Language	English	
Year range (publication year)	1970 to present	

Figure 3. *(continued)* Inclusion and exclusion criteria.

Year First author	Article title	Outcomes
Incentive program		
2006 Wall[9]	Effectiveness of Monetary Incentives in Modifying Dietary Behavior: A Review of Randomized, Controlled Trials	Effectiveness of monetary incentives in modifying dietary behavior
2013 An[10]	Effectiveness of Subsidies in Promoting Healthy Food Purchases and Consumption: A Review of Field Experiments	Effectiveness of monetary subsidies in promoting healthier food purchases and consumption
2017 Uricchio[11]	Tax Policies To Improve Diet and the Prevention of Non-Communicable Diseases	Efficacy of fiscal actions to improve diets and prevent non-communicable diseases
2017 Gittelsohn[12]	Pricing Strategies to Encourage Availability, Purchase, and Consumption of Healthy Foods and Beverages: A Systematic Review	Effect of food-pricing interventions on retail sales and on consumer purchasing and consumption of healthy foods and beverages
2019 von Philipsborn[13]	Environmental Interventions to Reduce the Consumption of Sugar-Sweetened Beverages and Their Effects on Health	Effects of environmental interventions (excluding taxation) on consumption of sugar-sweetened beverages, diet-related anthropometric measures and health outcomes
2019 Bennett[14]	A Systematic Review of the Extent and Influence of Price Promotions on Consumer Purchasing in Food and Beverage Retail Settings	Extent and influence of food and beverage price promotions on consumer purchasing behavior
2019 Roberts[15]	Efficacy of Population-Wide Diabetes and Obesity Prevention Programs: An Overview of Systematic Reviews on Proximal, Intermediate, and Distal Outcomes and a Meta-Analysis of Impact on BMI	Efficacy and impact of population-wide obesity and diabetes prevention programs on body mass index.
Path-to-Purchase Marketing		
2012 Gittelsohn[16]	Interventions in Small Food Stores to Change the Food Environment, Improve Diet, and Reduce Risk of Chronic Disease	Impact of small-store interventions on food availability, dietary behaviors, and psychosocial factors that influence chronic disease risk
2013 van't Riet[17]	Sales Effects of Product Health Information at Points of Purchase: A Systematic Review	Effectiveness of product health information for food products at the point of purchase.
2013 Au[18]	The Cost-Effectiveness of Shopping to a Predetermined Grocery List to Reduce Overweight and Obesity	Analyze cost-effectiveness of pre- commitment interventions that facilitate healthier diets to tackle obesity
2014 Liberato[19]	Nutrition Interventions at Point-of-Sale to Encourage Healthier Food Purchasing: A Systematic Review	Effectiveness of various types of interventions that have been used at point-of-sale to encourage purchase and/or eating of healthier food and to improve health outcomes
2017 Abeykoon[20]	Health-Related Outcomes of New Grocery Store Interventions: A Systematic Review	Assess impact of new food store (supermarket/grocery store) interventions on selected health-related outcomes
2018 Crockett[21]	Nutritional labelling for Healthier Food or Non-Alcoholic Drink Purchasing and Consumption	Assess impact of nutritional labelling for food and non-alcoholic drinks on purchasing and consumption of healthier items.

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Figure 5. Relevant retail nutrition programs and outcomes systematic reviews or meta-analysis published between 2006 and 2019.

Year First author	Article title	Outcomes
2019 Hsiao[22]	A Systematic Review of Mobile Produce Markets: Facilitators and Barriers to Use, and Associations with Reported Fruit and Vegetable Intake	Assess relationship between mobile produce markets and fruit and/or vegetable intake
Personalized Nutrition Education		
2009 Eyles[23]	Does Tailoring Make a difference? A Systematic Review of the Long-Term Effectiveness of Tailored Nutrition Education for Adults	Effectiveness of tailored nutrition education for adults.
2012 Eyles[24]	Tailored Nutrition Education: Is it Really Effective?	Effect of tailored nutrition education interventions where objective outcome measures (sales data) have been employed
2013 Smith[25]	Interventions to Improve Access to Fresh Food in Vulnerable Communities: A Review of the Literature	Assess whether community gardens can increase accessibility to healthy foods
2016 Nikolaus[26]	Grocery Store (or Supermarket) Tours as an Effective Nutrition Education Medium: A Systematic Review	Evaluate grocery store tours as an effective nutrition education medium for improving nutrition knowledge and food-related behavior
2018 Hartmann-Boyce[27]	Grocery Store Interventions to Change Food Purchasing Behaviors: A Systematic Review of Randomized Controlled Trials	Effectiveness of grocery store interventions to change food purchasing behavior
Multiple Interventions: Path-to-Purchase Marketing Plus Personalized Nutrition Education		
2013 Langellier[28]	Corner Store Inventories, Purchases, and Strategies for Intervention: A Review of the Literature	Assess inventories and sales in corner stores, as well as to identify intervention strategies employed by corner store conversions.
2013 Escaron[29]	Supermarket and Grocery Store-Based Interventions to Promote Healthful Food Choices and Eating Practices: A Systematic Review	Synthesize the evidence on supermarket and grocery store interventions to promote healthful food choices
2016 Cameron[30]	A Systematic Review of the Effectiveness of Supermarket-Based Interventions Involving Product, Promotion, or Place on the Healthiness of Consumer Purchases	Effectiveness of interventions that target the in-store supermarket environment for improving the healthiness of population food purchases
Multiple Interventions: Path-to-Purchase Marketing Plus Incentive Programs		
2015 Mayne[31]	Impact of Policy and Built Environment Changes on Obesity-Related Outcomes: A Systematic Review of Naturally Occurring Experiments	Evaluate the efficacy of policy and built-environment changes on obesity-related outcomes
2016 Adam[32]	What is the Effectiveness of Obesity Related Interventions at Retail Grocery Stores and Supermarkets? A Systematic Review	Effectiveness of food store interventions intended to promote the consumption of healthy foods
2019 Mah[33]	A Systematic Review of the Effect of Retail Food Environment Interventions on Diet and Health with a Focus on the Enabling Role of Public Policies	Effectiveness of retail food environment interventions in influencing diet and exploration of the underlying role of public policy

Figure 5. *(continued)* Relevant retail nutrition programs and outcomes systematic reviews or meta-analysis published between 2006 and 2019.