Actions in global nutrition initiatives to promote sustainable healthy diets

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ABSTRACT

Multiple recent global nutrition initiatives have recommended actions to transform food systems to improve food environments and food choice. This study aimed to identify actions recommended by these initiatives and understand their similarities and differences. Twelve global nutrition initiatives were reviewed, collectively spanning 13 action themes and accompanying strategies. Action themes were analyzed according to primary focus on either food environments and their food system drivers or food choice. Representation of the 13 actions varied across initiatives. Some actions overlapped; others were infrequently represented. Strategies targeting food environments and their food system drivers were more frequently recommended than strategies targeting food choice for 11 of the 13 action themes. Although these global initiatives share a mission to improve nutrition through food systems and food environments, less attention has been allocated to individual food choice and sustainability.

1. Introduction

Global initiatives to support sustainable healthy diets increasingly focus on integrated actions addressing food systems, food environments, and their influence on diets, nutrition, and health. The Rome Declaration on Nutrition of 2014, the Sustainable Development Goals of 2015, and the United Nations (UN) Decade of Action on Nutrition of 2016 established targets to eradicate all forms of malnutrition by 2030, collectively calling for sustainable change in food systems to protect human and planetary health (Development Initiatives, 2018). Sustainable healthy diets are accessible, affordable, safe, equitable, and culturally acceptable dietary patterns that promote health and have a low environmental footprint (FAO & WHO, 2019). Healthy diets have a preponderance of foods that are not excessively energy-dense and are nutrient-rich. Unhealthy diets can include both insufficient and

excessive amounts of key nutrients. Underweight results from low energy intake. Overweight and micronutrient deficiencies often result from diets that are rich in energy, fat, sugar, and salt but poor in micronutrients and other macronutrients, including dietary fibers. Having a low environmental footprint may mean, for example, moving to more plant-based diets where consumption of animal-source foods is excessively high to reduce greenhouse gas emissions and expansion of land use into forested areas. Food environments are key entry points for interventions and policy action to facilitate and promote sustainable healthy diets and reduce nutrition-related disease.

The food environment is the interface between individuals and wider physical, economic, political, and socio-cultural drivers of food systems (Food and Agriculture Organization of the United Nations, 2016; Swinburn et al., 2013; Turner et al., 2018). Individuals make choices about food and beverages from acquisition to consumption within the context of the opportunities, constraints and individual-level personal

Abbreviations	
DFC	Drivers of Food Choice
LMIC	Low- and middle-income countries
SME	Small- and Medium-Sized Enterprises
UN	United Nations
UNICEF	United Nations Children's Fund
FAO	Food and Agriculture Organization of the United Nations
WHO	World Health Organization

influences of the food environment. (Blake et al., 2021; FAO & WHO, 2019; Food and Agriculture Organization of the United Nations, 2016; HLPE, 2017; Sobal and Bisogni, 2009; Swinburn et al., 2013; Turner et al., 2018). Individuals' food choices can be deliberate or habituated (Blake et al., 2008). They occur within, and are influenced by, the food environment and wider food system drivers.

Ensuring sustainable healthy diets for all necessitates special consideration of food systems in low- and middle-income countries (LMICs). LMICs face persistent undernutrition and micronutrient deficiencies and increasing prevalence of overweight, obesity, and diet-related non-communicable disease (UNICEF, 2019). This multiple burden of malnutrition has short- and long-term health and economic consequences (Murray et al., 2020; UNICEF, 2019). The increasing globalization of food systems in LMICs stimulates consumption patterns characterized by overconsumption of unhealthy foods and under-consumption of healthy foods, relying on unsustainable production and transportation methods (Baker et al., 2021; Popkin et al., 2012, 2020). High-income countries face similar issues, but the shifts are occurring more rapidly in LMICs, adding significant stressors to resource-poor contexts. Evidence about food environments, food choice, and their interactive relationship (i.e., how environments shape food choice and vice versa) remains limited (Turner et al., 2019), posing a challenge to applying recommendations for action across different settings, including LMICs.

Multiple high-level global nutrition initiatives have made recommendations for actions in the food system across geographic and economic contexts. For these initiatives to promote sustainable healthy diets, and with the growing understanding that food environments and food choice are mutually reinforcing, they must do so through actions that modify food environments and food choice. No studies have examined the similarities and differences across initiatives. The purpose of this study was to review recommended actions in the food system that are aimed at improving food environments and/or food choice across global nutrition initiatives to understand what actions are recommended and their similarities and differences. This study provides an opportunity to understand where convergence and momentum lies for solutions addressing food systems to support sustainable healthy diets across diverse geographical and economic settings, including in LMICs.

2. Methods

2.1. Identification strategy

We reviewed actions aimed at improving food environments and food choice that were recommended in global nutrition initiatives. Relevant initiatives were identified between January and June 2020. Inclusion criteria for this review were: (1) publications of a global nutrition initiative, which are defined as expert-committee reports put forth by agencies with global reach, and peer-reviewed publications that included recommendations for action pertinent to nutrition and food systems; (2) publication since 2015 to align with the adoption of the UN Sustainable Development Goals and the UN Decade of Action on

Nutrition, which centered on eradicating hunger and all other forms of malnutrition, and together have heightened focus on food systems; and (3) focus on nutrition and food systems. We excluded documents that focused on specific populations, evaluated other documents in the sample, and were older versions of annual reports.

2.1.1. Working group recommendations
A working group from the Drivers of Food Choice (DFC) Program, comprising the lead author (LR) and four coauthors (SB, SC, EF, CB), initially suggested publications for review based on *a priori* knowledge of the documents' global reach, prominence, and momentum in food systems and nutrition dialogue. Further documents were added due to recurring citations in those initial publications. Documents were screened by title and abstract relative to inclusion criteria and exclusion criteria, and eight documents were identified through these methods.

2.1.2. Expert solicitation
These eight documents were provided to the eight other study co-authors who were content experts affiliated with DFC as grantees or as members of the DFC technical advisory group. The experts verified the documents' consistency with the definition of global nutrition initiatives as applied in this study and suggested six documents for review. These documents were screened by LR and SB by title and abstract relative to inclusion criteria, and five documents were retained; one was excluded which duplicated a previous document.

2.1.3. Strategic search
Based on the recommendation from the working group and to complement the first two identification strategies, a strategic search was conducted on the websites of ten agencies and alliances known to have significant presence and activity in disseminating nutrition guidance globally, especially LMICs. The search was guided by the following keywords: "food choice", "food systems", "food environment", "food systems and actions", and "global initiatives". The resulting seven documents were retained after screening by SB by title, abstract, or executive summary to ensure the documents met the inclusion criteria.
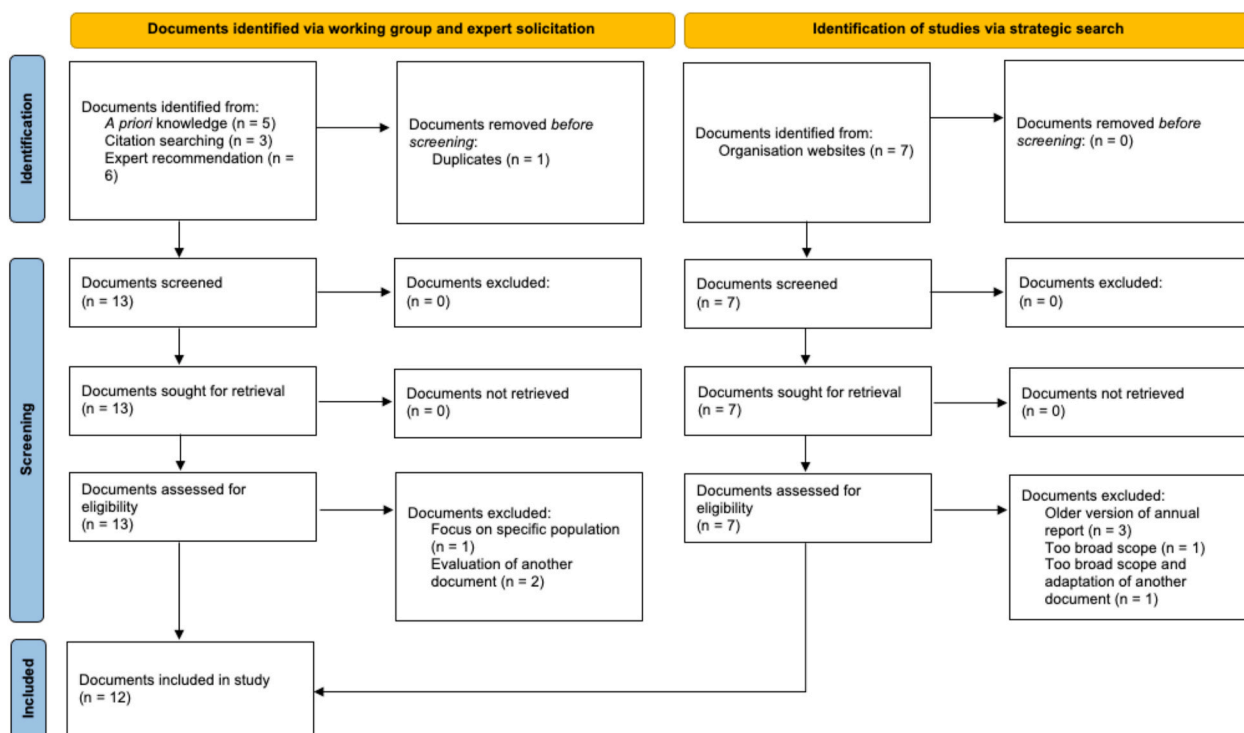
2.2. Selection

A full-text review of the 20 documents conducted by LR and SB excluded eight documents (Fig. 1). From the documents identified through expert solicitation, one was excluded as an evaluation of a document previously included, one because it focused on children, and one as an evaluation of another document. From the documents identified in the strategic search, three documents were excluded as older versions of reports published annually, one due to its lack of acknowledgment of food environments and focus on higher level food systems only, and one because the document focused more on climate change than food environments and was an adaptation of a document already included. The resulting 12 documents were discussed among the working group to finalize their selection for analysis (Table 1).

2.3. Data extraction

2.3.1. Identification of themes
LR and SB used thematic analysis to identify action themes, presented in the documents as action areas, commitments, recommendations, or strategies. The action themes broadly represented the specific descriptions of actions in the food system in the 12 initiatives. The guiding question for this emergent procedure was "what is needed to improve food environments and food choice to promote sustainable healthy diets?" We reviewed the specific action descriptions from a subsample of documents (n = 6), noting the main messages described in each document. Common themes in actions were identified across the documents, for each of which an overarching action theme was drafted. For those actions that did not fit into existing themes, a new theme was

Fig. 1. Flow diagram of global nutrition initiative selection process (Adapted from: Page ML, McKenzie JE, Bossuyt PM, Boutron I, Hoffman TC, Mulrow CD et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021; 372:n71. https://doi.org/10.1136/bmj.n71. For more information, visit: http://www.prisma-statement-org/).

drafted. The themes were reviewed by the working group and then shared with the expert group for feedback and refinement.

2.3.2. Data extraction procedure

All documents (n = 12) were reviewed fully. We developed a matrix to extract and tabulate action descriptions from each document across the action themes. Each column corresponded to an action theme and each row to a document. As possible, we (i.e., LR and SB) retained terminology as originally presented in the documents, followed by synthesis of the content to bring forth how the descriptions aligned with the theme(s) to which they were assigned. Each analyst tabulated content from different documents and consulted with the other after completion of each document and when uncertain about where to assign descriptions. In cases of disagreement, additional coauthors from the working group were consulted to obtain consensus.

Table 1
Documents selected for this review.

Publisher	Title	Citation	Abbreviation
Committee on Global Food Security	High Level Panel of Experts Report - Nutrition and food systems	HLPE (2017)	HLPE-2017
Committee on Global Food Security	High Level Panel of Experts Report - Food security and nutrition: Building a global narrative towards 2030	(HLPE, 2020)	HLPE-2020
Consultative Group on International Agricultural Research	An Alliance for Accelerated Change. Food system solutions at the nexus of agriculture, environment, and nutrition. Strategy 2020–2025	(Alliance of Bioversity International and the International Center for Tropical Agriculture, 2019)	CGIAR-2019
Food and Agriculture Organization	The State of Food Security and Nutrition in the World Report – Transforming food systems for affordable healthy diets	(FAO, IFAD, UNICEF, WFP and WHO, 2020)	SOFI-2020
Global Alliance for Improved Nutrition	A menu of actions to shape urban food environments for improved nutrition	(Halliday et al., 2019)	GAIN-2019
Global Nutrition Report	Nutrition for growth. Commitment-making guide	(Nutrition for Growth, 2020)	N4G-2020
Global Panel on Agriculture and Food Systems for Nutrition	Future Food systems: For people, our planet, and prosperity	(Global Panel on Agriculture and Food Systems for Nutrition, 2020)	GLOPAN-2020
The Lancet	Double burden of malnutrition 3. Double-duty actions: Seizing programme and policy opportunities to address malnutrition in all its forms	(Hawkes et al., 2020)	DBM-2020
The Lancet	Food in the Anthropocene: The EAT-Lancet Commission on healthy diets from sustainable food systems	(Willett et al., 2019)	EAT-2019
The Lancet	The global syndemic of obesity, undernutrition, and climate change: The Lancet Commission report	(Swinburn et al., 2019).	SYN-2019
United Nations System Standing Committee on Nutrition	United Nations Decade of Actions on Nutrition 2016–2025	(United Nations Standing Committee on Nutrition, 2016)	UN-DAN-2016
United Nations System Standing Committee on Nutrition	Food environments: Where people meet the food system. The role of the government in improving urban nutrition	(United Nations System Standing Committee on Nutrition, 2019)	UNSCN-2019

2.3.3. Data management and analysis

Content in each document assigned to each of the action themes was unpacked by explicit focus on the food environment and food choice. This unpacking identified how recommended food-system strategies aim to modify food environments and food choice and helped diagnose where actions were prioritized.

We developed a guide (Table 2) building from existing frameworks to characterize actions as those aimed at modifying the food environment and food choice. Food environment and food choice concepts were selected based on their presence in multiple frameworks and applicability to the action descriptions. To select food environment concepts, we primarily considered a framework of food systems for diets and nutrition (HLPE, 2017), a framework depicting external and personal domains of the food environment (Turner et al., 2018), and a graphical representation of key elements of the food environment (Downs et al., 2020). These food environment concepts were selected: production systems, retail and markets, food availability, food accessibility, food affordability, promotion/advertising/information, marketing and regulation, food quality, food safety, and convenience. To select food choice concepts, we primarily considered the process model of food choice (Furst et al., 1996; Sobal and Bisogni, 2009), determinants of food choice and dietary change model (Contento, 2016), the DONE framework (Stok et al., 2017), and a socioecological framework depicting drivers of what people eat within their food environments (Story et al., 2008). These food choice concepts were selected: preferences, knowledge, skills, social norms, food acceptability, and food behaviors (acquisition, preparation, distribution, and consumption).

All content from the matrix was transferred to Microsoft Word files, with one file per action theme. Each file included descriptions from each initiative in which the action theme was identified. Descriptions of the recommendations from each document were then individually summarized with respect to explicit consideration of food environments or food choice, using the concepts identified in Table 2. This procedure was pilot tested, discussed with the working group, and adjusted before being conducted by LR and SB. For the unpacking of each action that one analyst completed, the other was tasked with reviewing the content completed and providing feedback.

3. Results

Thematic analysis identified 13 different action themes, although these were not necessarily mutually exclusive (Table 3).

3.1. Convergence across global nutrition initiatives

The 13 action themes had varying representation across the 12 documents (Table 4). All 13 actions were anchored to the goal of sustainable healthy diets.

3.2. How the 13 action themes address food environments and food choice

The unpacking of each action theme showed variation in how food environments and food choice are prioritized to achieve change (see

Table 2
Guide to unpacking actions by food environment or food choice focus.

	Concept	Definition used in unpacking process
Targeting food environment	Production systems	Production systems can be either cultivated or wild (Downs et al., 2020) and consist of the processes and infrastructures that involve farmers, indigenous people, agribusiness, land, water, and plantation owners to produce, gather, or catch crops, livestock, and fish (HLPE, 2017).
	Retail & markets	Retail and markets are a part of built food environments, where retailers, vendors, food outlet owners, traders, restaurants, and wholesalers among others sell food to consumers (Downs et al., 2020; HLPE, 2017).
	Food availability	Food availability refers to the presence of food sources or products within a given context (Turner et al., 2018).
	Food accessibility	Food accessibility refers to adequate infrastructure to access food sources and encompasses physical distance, time, space and place, individual activity spaces, daily mobility, modes of transport (HLPE, 2017; Turner et al., 2018).
	Food affordability	Food affordability is the relative cost of food, which includes food prices, relative to a household's income and purchasing power (HLPE, 2017; Turner et al., 2018).
	Promotion, advertising, & information	Promotion, advertising, and information are activities that are designed to influence consumers' food choice through broadcasting, print and digital advertising; packaging, labelling and point of sale promotions; branding and sponsorship; merchandising and the use of licensed or brand-based characters (HLPE, 2017). These usually involve the private sector and are closely tied with consumer knowledge.
	Marketing & regulation	Marketing and regulation refer to policies, rules, and standards set by governments, public or private entities to supervise and control food value chains, markets, promotion, and advertising (HLPE, 2017; Turner et al., 2018).
	Food quality	Food quality refers to the attributes of a food that influence its value and make it acceptable or desirable for the consumer. These attributes include food composition (e.g., nutrients, ingredients), processing methods (e.g., organic, without antibiotics), and other attributes like size, shape, color, texture, and flavor (HLPE, 2017).
	Food safety	Food safety refers to hazards in food that may be harmful to consumer health (HLPE, 2017).
Targeting food choice	Preferences	Preferences refers to the selection of one food item over another; food preferences are formed through a combination of biological predispositions to accept or reject certain tastes and repeated experiences with food and eating and are shaped by factors such as promotion and marketing (Birch, 1999; Contento, 2016)e4ZAsx
	Knowledge	Knowledge refers to an individual level psychological attribute that involves cognition and awareness and is relevant for diet and eating (Stok et al., 2017).
	Skills	Skills refer to an individual level attribute that involves motor acts and practices and is relevant for diet and eating (Stok et al., 2017).
	Social norms	Social norms refer to a learned system of rules, maps, and plans shared by a group of people, which can be used as reference points by individuals to assess and judge food behaviors (Furst et al., 1996; Sobal and Bisogni, 2009; Stok et al., 2017).
	Convenience	Convenience refers to the relative time and effort, and perception of this, that individuals allocate to facilitate collection, gathering, preparation, cooking, and consumption of food or food products (Turner et al., 2018).
	Food acceptability	Acceptability refers to people's attitudes and perceptions about attributes of particular food products and whether these food products meet their personal standards (Caspi et al., 2012; HLPE, 2017).
	Acquisition	Acquisition refers to procuring foodstuffs and foods from home production, markets, institutions, or interpersonal exchanges (Sobal and Bisogni, 2009).
	Preparation	Preparation refers to transforming raw materials into edible foods using a variety of techniques to change form, temperature, and other attributes (Sobal and Bisogni, 2009).
	Distribution	Distribution refers to arrangements of the eating setting, presentation of foods, and distribution to individuals who are eating (Sobal and Bisogni, 2009).
	Consumption	Consumption refers to the intake and ingestion of food (Sobal and Bisogni, 2009).

Table 3
Action themes represented across global nutrition initiatives.

Action theme	Focus of recommended actions
1. Prioritize agricultural production of a diverse range of nutrient-rich foods	Diversifying production of nutrient-rich foods across rural and urban settings with an emphasis on the tailored needs of small-scale producers, women in agriculture, and urban and peri-urban agriculture.
2. Protect nutrient-rich wild foods and species-rich ecosystems on land and in oceans	Safeguarding biodiversity and conservation of neglected and underutilized species of foods that are nutrient-rich and contribute to the sustainability of land and ocean ecosystems.
3. Support connectivity of smallholders and Small and Medium Sized Enterprises (SMEs) across food value chains	Building capacity among small-scale farmers and SMEs to produce, retain, and sell healthier food products with emphasis on creating markets for local farmers and improving the connection to consumers.
4. Redesign safety net/social protection programs towards improved nutritional outcome	Integrating healthy diets into safety net and social protection programs primarily through counseling, cash-transfer and vouchers, and school feeding programs aimed at the most vulnerable populations.
5. Reduce food loss and food waste	Reducing food loss and food waste across value chains, especially during transportation and storage, and primarily rely on new technology, policies, and communication strategies.
6. Improve food quality and safety	Improving the quality and safety of foods primarily through trade, policy, techniques for biofortification of crops, and reformulation of processed foods as well as certifications and investments to improve food safety among informal vendors and markets.
7. Strengthen regulations for advertising and marketing	Strengthening trade agreements, policies, and other regulations from global to local level to regulate advertising, marketing, and promotion of energy-dense and nutrient-poor ultra-processed foods more strictly, including breastmilk substitutes and fortified products.
8. Improve transparency in food labeling	Implementing global and national standards to make nutritional information more transparent on packaged products through simplified labeling that enables consumers to make informed decisions.
9. Encourage healthier eating through subsidies and promotions of healthy foods and taxes on unhealthy foods	Using taxes, subsidies, and promotions across the value chain to balance incentives that can facilitate and respond to increased demand for healthy foods, and disincentivize continued practices non-conducive to better nutrition.
10. Create consumer demand for healthy foods (nutrition education & civic engagement)	Integrating comprehensive nutrition education inclusive of nutrient-specific information, dietary habits, and environmental footprint among others into policy, schools, and programs to create a strong basis for consumer-driven demand for healthy foods.
11. Improve acceptability of healthy foods	Improving consumer acceptability of healthy foods by promoting their desirable taste, cultural relevance and improving convenience.
12. Promote traditional foods and methods that impart nutritional benefits	Promoting indigenous and traditional foods, production practices, and preparation methods that enhance the bioavailability of micronutrients and respect long-standing knowledge systems.
13. Invest in metrics, research, and access to inform policy development	Restructuring investment in research, metrics development, and agricultural technology that prioritize collaborations between scientists, policy makers, practitioners, and other diverse stakeholders to co-create policy-relevant information that is widely accessible and has positive impacts on nutritional outcome and the environment.

examples in Appendix 1). We summarize how recommended strategies that modify food environments or food choice directly can operate, both downstream and upstream, to promote sustainable healthy diets.

3.2.1. Action 1. prioritize agricultural production of a diverse range of nutrient-rich foods

This action was identified in 11 of 12 documents. All documents offered recommendations for changing the food environment; three also focused directly on food choice. The recommendations generally framed production systems as crucial to reshape food environments by diversifying the availability, accessibility, and affordability of healthy foods in rural, peri-urban, and urban settings. Strategies for diversifying agricultural production included facilitating incentives, redirecting subsidies, strengthening investor coalitions, developing climate-smart technologies, and using fiscal instruments. Recommendations to modify individual food choice focused on promoting retention of nutrient-rich foods from production and skills to diversify production sustainably through communication strategies. Women's empowerment via control of productive resources was prominent but mindful of the potential effects on women's available time. Production systems were linked to food security with attention to trade-offs between selling (income-generation) and home consumption. Urban and peri-urban agriculture, in particular, addressed demand for healthy foods.

3.2.2. Action 2. protect nutrient-rich wild foods and species-rich ecosystems on land and in oceans

This action was identified in five documents. All offered food environment recommendations; three also focused directly on individual food choice behavior. Food environment recommendations described conserving wild and cultivated biodiversity to sustainably produce underutilized and nutrient-rich varieties of food. Strategies included implementing policies and incentivizing protection of local agro-biodiversity and promoting production and access to wild and neglected nutrient-rich foods. To modify food choice, strategies focused on

promoting consumption of underutilized nutrient-rich species by supporting and preserving traditional knowledge and perceptions of what is edible, reducing time dedicated to gathering of wild foods, and integrating behavior change communication.

3.2.3. Action 3. support connectivity of smallholders and small- and medium-sized enterprises (SMEs) across food value chains

This action was identified in 11 documents. All offered strategies for food environment change; seven focused directly on food choice. Recommendations focused on enhancing reach and building capacity among small-scale farmers and SMEs to produce, retain, and sell healthier food products. Food environment strategies included improving roads to facilitate farmer and consumer access to markets, incentivizing small farmers to produce nutrient-rich food, while improving affordability for consumers, and linking small-scale farmers and SMEs to school-settings, and public and private sectors to create reliable markets. Strategies to modify food choice consisted of educating small producers about consumption from their own production with special attention on women for their prominent roles in food acquisition and preparation. In synchrony with improved connectivity between producers and schools, attention was given to food behavior modification towards healthy food choices that could further trickle down into households.

3.2.4. Action 4. redesign safety net/social protection programs towards improved nutritional outcomes

This action was identified in 10 documents. All offered strategies targeting the food environment; six also offered strategies directly targeting food choice. Recommendations focused on redesigning social protection and safety nets programs to improve availability, accessibility, but especially affordability, of healthy foods through agriculture-nutrition programs, cash transfer programs, and public school-meal programs. As part of the redesign of these programs, strategies included establishing nutrition criteria to improve the quantity and

Table 4

Presence of action themes and focus of specific recommendations addressing food environments and food choice in global nutrition initiatives.

Action theme	Global nutrition initiative											
	DBM-2020	SYN-2019	N4G-2020	UNSCN-2019	EAT-2019	GLOPAN-2020	HLPE-2017	HLPE-2020	UN-DAN-2016	CGIAR-2019	SOFI-2020	GAIN-2019
1. Prioritize agricultural production of a diverse range of nutrient-rich foods	B	E	E		B	E	B	E	E	E	E	E
2. Protect nutrient-rich wild foods and species-rich ecosystems on land and in oceans					E		B	B	E	B		
3. Support connectivity of smallholders and SMEs across food value chains	B		B	E	E	B	B	E	B	B	B	E
4. Redesign safety net/social protection programs towards improved nutritional outcome	B	B		E	E	B	B	B	B		E	E
5. Reduce food loss and food waste					B	B	E	B	B		E	
6. Improve food quality and safety			E	E	E	B	B	B	E	B	B	B
7. Strengthen regulations for advertising and marketing	B	E		B	E	E	B		E		E	B
8. Improve transparency in food labeling	B	B	E				B				E	B
9. Encourage healthier eating through subsidies and promotions of healthy foods and taxes on unhealthy foods	B	B		B	E	B	B	B	E		B	B
10. Create consumer demand for healthy foods (nutrition education & civic engagement)	B	B	C		B	B	B	B	B	B	B	B
11. Improve acceptability of healthy foods	B				C	B	B			C		
12. Promote traditional foods and methods that impart nutritional benefits		C				C						B
13. Invest in metrics, research, and accessible evidence to inform policy development		B	B		E	E	E	E	E	B	B	E

Note: E = food environment strategy only; C = food choice strategy only; B = strategies focused on both food environments and food choice.

quality of foods for under-resourced and vulnerable segments of the population. These programs advocated access to healthy food as a human right and were framed with long-term (i.e., poverty reduction, price shock mitigation) and short-term (i.e., emergency relief) goals. To modify food choice, some recommendations aimed to build knowledge and skills to change perceptions about healthy foods and motivate consumption through the application of behavior change communication, whereas one initiative considered tying targeted income transfers to enhanced dietary demand among the poor.

3.2.5. Action 5. reduce food loss and food waste

This action was identified in six documents. All offered strategies modifying the food environment; four also directly addressed food choice. Overall, recommendations focused on reducing food losses and waste across the value chain to improve the availability of healthy foods at affordable prices while reducing the environmental impact of agricultural production systems. Food environment strategies included reducing postharvest waste and nutrient loss by investing in technology and developing infrastructures to improve storage and transportation especially in developing countries and in parts of value chain where food loss is greatest. Food choice strategies included promoting food loss messages to improve food purchase planning, household food storage, food preparation techniques, and leftover use, especially in industrialized countries.

3.2.6. Action 6. improve food quality and safety

This action was identified in 10 documents. All offered strategies modifying the food environment; six also offered strategies modifying food choice. In general, recommendations focused on improving availability, access, and affordability of foods that are healthy, minimally processed, and safe. Food environment strategies included improving monitoring capacity of food markets, re-orienting food safety policies to

include informal and wet markets, employing sustainable practices of safe animal-source food production, integrating food safety into trade agreements and investment policies, developing legislation to regulate food processing (e.g., banning trans fats), maintaining price stability of minimally processed foods, and regulating the quality of food distributed in public institutions (e.g., schools, care homes, prisons). Strategies that addressed food choice considered attention to cultural acceptability of the healthy and diverse foods supplied, promoting desirability of healthy foods, while reducing preferences for energy-dense, nutrient-poor, and highly processed foods through the adoption of a nutrition-sensitive value chain.

3.2.7. Action 7. strengthen regulations for advertising and marketing

This action was identified in nine documents. All offered strategies to modify the food environment; four also offered strategies to modify food choice directly. Recommendations focused on restricting advertising, marketing, and promotion of unhealthy products, which extended to fortified products and breastmilk substitutes. Food environment strategies included developing legally binding trade agreements with global standards for marketing restrictions that align to improve diet quality, implementing zoning regulations for new food outlets near schools with adequate oversight, promoting availability of healthy food outlets, using marketing strategies (e.g., product placement, branding, color) to promote nutritious foods, and controlling advertising directed to children with better integration of evidence on dietary intake effects. Strategies focused on influencing food choice included integrating acceptability and preferences in the promotion of healthy diets, which aimed to shift desirability and consumption towards healthier options that could be further supported by changes in the food environment that make healthy options the default.

3.2.8. Action 8. improve transparency in food labeling

This action was identified in six documents. All offered specific strategies modifying the food environment and four also addressed food choice directly. Overall, recommendations focused on improving transparency of nutrition labeling to enable consumers to make informed food choices. Strategies aimed at the food environment included developing legally binding trade agreements with global standards for labeling that align to improve diet quality, imposing mandatory labeling of trans fats and salt levels, regulating industry with simplified and visible nutrition labeling (e.g., front-of-package labeling, traffic light colors), and integrating accurate nutrition labeling information for consumers in national dietary guidelines. Strategies to modify food choice were directly related to intended improvements in food labeling, whereby these could facilitate healthy food choices, improve food literacy and desirability, and reduce consumption of unhealthy contents. One strategy further expanded that labeling should include the impact of products to consumers to create demand-driven pressures for more sustainable practices and products.

3.2.9. Action 9. encourage healthier eating through subsidies and promotions of healthy foods and taxes on unhealthy foods

This action was identified in 10 documents. All presented strategies directed to the food environment; eight also addressed food choice. Recommendations focused on the use of taxes, subsidies, and promotions across the value chain to stabilize prices of nutritious foods. Strategies to modify the food environment included imposing taxes on unhealthy foods and beverages, regulating prices of vegetables and fruits where fluctuations are prominent, imposing investment conditionalities that align with improved nutrient-quality, providing incentives to improve the quality of processed foods, incentivizing opening of grocery outlets in food deserts, and extending subsidies and incentives to informal market vendors and producers that offer healthy foods. Attention to food choice was indirect and embedded within these food environment strategies aiming to facilitate access to healthy foods in relation to food outlets, promoting purchase of healthy products in relation to prices, and discouraging consumption of unhealthy products in relation to taxes.

3.2.10. Action 10. Create consumer demand for healthy foods (nutrition education & civic engagement)

This action was identified in 11 documents. Ten presented strategies aimed at the food environment and all 11 addressed food choice. In general, recommendations focused on integrating comprehensive nutrition education for consumers, along with other forms of information diffusion, into policy, schools, and programs to create a strong basis for consumer-driven demand for healthy and sustainable foods. Strategies operating in the environment and those directed at food choice were synchronous. Strategies to modify the food environment included using food labels to communicate nutrition information and messages, taxation schemes, national school curriculum, social protection, and agriculture programs to generate national and international pressure and commitment for healthy diets, adopting conflicts of interest guidelines for undue influence in policy development, integrating participatory elements to address consumer preferences in new crop varieties, developing context and culturally relevant food based dietary guidelines to support healthy food choices, and improving nutrition guidelines and food-literacy curriculum in schools tailored to youth and their parents. Strategies to modify food choice were anchored on building knowledge and skills to raise awareness, shape tastes, and motivate consumption of healthy diets from sustainable food systems through behavior change communication, educational campaigns, social movements, and technology. There was attention to designing and testing diverse behavior change interventions to effectively drive consumer behavior towards healthier diets. Educational components extended to budgeting and resource management and aimed to address norms by eliciting healthy habits and cultural change over time. There was also attention to

investing in civil groups and consolidating alliances to increase demand-driven pressure for business practices.

3.2.11. Action 11. Improve acceptability of healthy foods

This action was identified in five documents, within which three presented strategies aimed at the food environment, and all presented strategies aimed at food choice. Recommendations focused on improving consumer acceptability of healthy foods by promoting their desirable taste, cultural relevance, and improving convenience. Strategies in the food environment consisted of integrating nutritional guidance into school feeding programs and promoting technologies that improve the quality of products, including packaged ones, with attentiveness to better affordability and convenience of healthy products to make these more acceptable. Additionally, using advertisement, marketing, and branding strategies can promote acceptability of healthy foods. These strategies were directly targeting food choice and aimed to build knowledge and skills to create awareness, shape preferences, and motivate consumption of healthy foods. Furthermore, descriptions emphasized cultural appropriateness, tastiness, and time demands as critical to improve nutritious acceptability.

3.2.12. Action 12. Promote traditional foods and methods that impart nutritional benefits

This action was identified in three documents. All offered strategies that directly addressed food choice, and one offered strategies aimed at interventions in the food environment. Overall, recommendations focused on promoting indigenous and traditional foods, production practices, and preparation methods that enhance the bioavailability of micronutrients and respect traditional knowledge that promotes healthy diets. In the environment, the main strategy encouraged growing indigenous edible plants in community gardens in urban and peri-urban settings to improve availability, especially among women to foster their empowerment. Strategies for food choice modifications focused on preserving indigenous and traditional knowledge, including how to use different species. The value of these traditional ways was further highlighted in a drive to promote traditional food cultures, preparation practices, and cooking skills that impart nutritional and health benefits.

3.2.13. Action 13. Invest in metrics, research, and accessible evidence to inform policy development

This action was identified in 10 documents; all presented strategies directed to the food environment and four also explicitly addressed food choice. Recommendations focused on restructuring investment in research, development of metrics, and agricultural technology that prioritize collaborations between scientists, policy makers, practitioners, and other diverse stakeholders to generate policy-relevant information that is widely accessible and has positive impacts on nutritional outcomes and the overall environment. Regarding development of metrics, the recommendations were around increasing investments and research to develop metrics for upstream monitoring of policy implementation and healthy environments, nutrient productivity metrics that assess kg of nutrient produced per unit of land or labor, and metrics to understand how the changing food environments can affect food safety. Pertinent to food environments was the call for investment in empirical evidence across the food system to inform policy development about entry points to improve accessibility, affordability, and safety of sustainable healthy diets. This investment would entail new metrics, technology, research, and collaborations that range from trade agreements to consumer behavior. There was particular attention to improving agricultural capacity to produce more nutritious products with less environmental footprint and making the technology and guidance accessible. Relatedly, the documents also emphasized the need for evidence to support the scalability of policies and interventions to improve nutritional outcomes in changing food environments, including how this change occurs across different settings. Investment focused on the agency of individuals related to concerted effort to understand and

preserve traditional knowledge and ways, boosting demand for healthy and sustainable food choices, supporting demand-driven research, and evaluating implementation of programs with effort to understand consumer behavior.

4. Discussion

Global nutrition initiatives have recommended actions for food system transformations and multiple entry points across the food system to promote sustainable healthy diets (Hawkes et al., 2020). The documents reviewed represent a subset of prominent nutrition initiatives with global reach put forth by different agencies and alliances. This study distills the messages being promoted about what, where, and how change is needed to promote sustainable healthy diets through interventions in the food environment, wider food system drivers of the food environment, and individual food choice. The 13 action themes across 12 prominent global nutrition initiatives highlight the breadth of recommendations and their considerable overlap across initiatives. Action themes for which there is greater convergence can validate and maintain momentum for recommended actions. Unpacking the recommendations within each theme across initiatives demonstrated the types of actions being prioritized, primarily actions aimed at altering food environments and their food system drivers, rather than actions aimed at creating demand from food systems for healthy foods by modifying food choice.

The 13 action themes focused on modifying food environments through well-defined strategies that will theoretically improve food choices to facilitate sustainable healthy diets. The action themes acknowledged less the importance of individual behavior and decision-making related to individuals' acquisition, preparation, storage, allocation, and consumption of foods and the reciprocal influence of those decisions on the food environment and local, regional, and global food systems (Wertheim-Heck et al., 2014). Individual food choices and the justifications or factors that influence those choices can shape the food environment (e.g., demand creation for products, safe practices), and ignoring this direction of the relationship represents missed opportunities for actions potentially effective at this interface with the wider food system.

Only two action themes (Action 10: create consumer demand for healthy foods (nutrition education & civic engagement), and Action 11: improve acceptability of healthy foods) included both food environment and explicit food choice strategies in every document in which they were represented. This limited attention to both types of strategies is important because a combination of actions within the food system that modify both food choice and the food environment is required to promote sustainable healthy diets (Osei-Kwasi et al., 2021). Heterogeneity of food environments combined with regional differences in political economies and the ability to implement recommendations necessitate combining strategies to address multiple malnutrition burdens (Laar, 2021). Greater attention is needed on the agency of individuals, the many factors influencing their choice, including those in the food environment, and the ways in which individual food choice behaviors contribute to demand for food and therefore shape food systems.

Especially for LMICs, many factors at the intersection of food environment and food choice affect individual behavior and vice versa (Boncyk et al., 2020; Downs et al., 2020; Green et al., 2020; Matita et al., 2021; Osei-Kwasi et al., 2021; Raneri and Wertheim-Heck, 2019; Schreinemachers et al., 2020, 2021; Turner et al., 2018, 2019; Wertheim-Heck and Raneri, 2019). Blake et al. (2021) describe the science of food choice, which calls for understanding why individuals eat the way they do by linking information about what is available and accessible in the food environment, the social context of food choices, how food is ultimately acquired, prepared, distributed, and consumed with an understanding of individual decision-making processes. Such understanding could help design and refine actions aiming to improve food choice and food environments in a rapidly changing developing world to

support sustainable healthy diets.

Environmental sustainability was consistently mentioned as an important goal in food systems transformations. Operationalizing sustainability in considerations of nutrition and health is nascent (Béné et al., 2019; LaCanne and Lundgren, 2018) and requires grappling with many environmental, economic, and dietary tradeoffs to promote strategies for sustainable healthy diets (Animal Source Foods in Ethical, Sustainable & Healthy Diets. A Dynamic White Paper, 2020; Global Panel on Agriculture and Food Systems for Nutrition, 2020; Wertheim-Heck et al., 2019).

Together, the global nutrition initiatives studied represent a shared mission to improve nutrition by systemic action across the food system, but mediated by each group's organizational perspectives and priorities, which are often directed to different audiences. The shared mission of food system transformation to promote sustainable healthy diets creates an illusion of a holistic orientation with global convergence on goals and priorities, but the observed differences in perspectives and intended audiences have repercussions for where attention is directed and how resources are allocated. Divergence in action themes and specific actions suggests differences in issue prioritization or intended outcome. For example, only three initiatives (SYN-2019, HLPE-2017, GAIN-2019), included mention of Action 12: the promotion of traditional foods and methods that impart nutritional benefits. Different stakeholders responsible for crafting these initiatives may have different, and potentially contradicting, views of what constitutes "healthy" and "unhealthy" food and what constitutes environmental sustainability of foods and diets (Aldaya et al., 2021). Differences or conflicts of opinion on priorities and goals could lead to competing investments (Walls et al., 2019). A lack of coherence about problems, priorities, and goals could hinder development of successful and evidence-based multisectoral strategies to promote sustainable healthy diets (Gillespie & van den Bold, 2017; Lapping et al., 2012).

These expert panels and other stakeholders with resources can influence discourse and direct attention and resources (Lauber et al., 2021; Milsom et al., 2020, 2021; Walls et al., 2020). Stakeholder perspectives represented in prominent global nutrition initiatives do not reflect the populations that they seek to support, such small-business owners, women in agriculture, and informal vendors. The perspectives of those for whom action is intended are essential particularly in LMIC, where food system transformations are both a necessity and a logistical hurdle. Authors of the global initiatives studied were predominantly technical experts rather than representatives of the communities impacted by recommendations for action. As more reports are released, acknowledgment of their perspective and orientation is needed to help highlight potential inequities in representation.

Food systems are complex. Promotion of food choices for sustainable healthy diets could consider complementary actions that address multiple related points of entry and multiple effects (Béné et al., 2020; Walls et al., 2019). The GLOPAN Foresight 2.0 Report (2020) is encouraging, acknowledging the need to reconcile policy incentives with food system goals, the diverse and sometimes contradictory motivations of powerful stakeholders, and the fractioning of consideration of individual food choice from food system practices to improve food systems overall and enable sustainable healthy diets. Actions to intervene in food systems to modify food environments and individual food choice behaviors occur within a larger system of economic, health, social, and environmental relationships influencing local, regional, and global food systems. Implementation of recommended actions necessitates consideration of all elements within this larger system to support the ability of diverse populations to achieve sustainable healthy diets (Milsom et al., 2019).

Many high-level expert panels are actively discussing and publishing reports about food system transformations. Although we identified initiatives using a three-pronged strategy, not all currently prominent initiatives were included in our sample. Analysis identified 13 actions that were all represented in at least five of the 12 documents, suggesting that there is sufficient overlap among initiatives to be considered

representative of the currently published initiatives. The recommendations of these panels only partially overlap, demonstrating value in multiple perspectives that can be applied across diverse settings.

We identified differences across documents, a minimal focus on specific actions for sustainability, and fewer perspectives that explicitly prioritized the influence of individual food choice on ensuring sustainable healthy diets, compared to modification of food environments. Although food environments and wider determinants of food systems are critical to ensuring sustainable healthy diets, individual food choice and its influence on diet, nutrition, health, and the environment must be given more attention in recommendations for action.

Food systems do not operate in the top-down and unidirectional way in which recommendations for action are often framed. These global-level recommendations for action are useful for providing guidance and direction when considering the allocation of time and resources, but they are not prescriptions to achieve desired outcomes. To continue momentum in food systems change aimed at facilitating sustainable healthy diets and improving the likelihood of successful multi-stakeholder involvement, a comprehensive set of food-system actions is needed, developed from diverse stakeholder perspectives, that 1) improves food choice and food environments; 2) explicitly links healthy diets with environmental sustainability; 3) ensures that all required orientations and strategies are represented, and 4) ensures that recommendations can be adapted, applied, and implemented in all populations and regions, including diverse LMIC settings.

Data availability

Global nutrition initiatives analyzed for this study are in the public

domain. Intermediate matrices used for the analysis are available from the authors upon request.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix 1. Representation of actions across global nutrition initiatives aimed at the food environment and food choice

Action 1. Prioritize agricultural production of a diverse range of nutrient-rich foods
Food environment (n = 11)   <u>Concepts included</u>
• Production systems/retail & markets/food availability/food accessibility/food affordability/food safety   <u>Examples of strategies</u>
• N4G: Incentivize production of healthier and environment conscious foods via investor coalitions   • SYN: Eliminate and redirect production subsidies from monoculture to healthy and sustainable production and consumption practices   • HLPE-2017: Improve landscape and dietary diversity accounting for trade-offs in production and income generation to purchase healthy foods   • SOFI-2020: Invest in homestead food production, integrate nutrition objectives in food and agricultural policies, support peri-urban and urban agriculture collectively
Food choice (n = 3)   <u>Concepts included</u>
• Knowledge/skills/acquisition/distribution/consumption   <u>Examples of strategies</u>
• DBM: Apply behavior change communication focused on healthy diets at the household level, promote retention of production for consumption or purchase of nutritious foods   • EAT: Equip rural farmers and women with information and skills to obtain healthy diets from sustainable food systems   • HLPE-2017: Strengthen women's ability to procure food
Action 2. Protect nutrient-rich wild foods and species-rich ecosystems on land and in oceans
Food environment (n = 5)   <u>Concepts included</u>
• Production systems/Food accessibility/Food quality   <u>Examples of strategies</u>
• EAT: Produce food sustainably from both land and water through implementation of various policies that conserve biodiversity and ecosystems   • HLPE-2017: Provide incentives to protect wild foods and improve agrobiodiversity in traditional food production systems   • HLPE-2020: Promote the production of nutritionally rich neglected and underutilized local varieties of food

(*continued*)

Action 1. Prioritize agricultural production of a diverse range of nutrient-rich foods

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- CGIAR: Improve access to wild and cultivated agricultural biodiversity for food and nutrition security and sustainable healthy diets

Food choice (n = 3)

<u>Concepts included</u>

- Convenience/Knowledge/Acquisition/Consumption

<u>*Examples of strategies*</u>

- HLPE-2017: Support and preserve traditional knowledge and perceptions regarding nutritional qualities of wild edible plants for utilization of such plants and reduce time constraints that people have in gathering of wild foods
- HLPE-2020: Promote consumption of nutritionally rich local and underutilized food varieties
- CGIAR: Promote consumer behaviors towards healthier diets, including neglected and underutilized species, fruits, and nuts through behavior change communications and policy incentives

Action 3. Support connectivity of smallholders and SMEs across food value chains

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Food environment (n = 11)

<u>Concepts included</u>

- Production systems/Retail & markets/Food availability/Food accessibility/Food affordability/Promotion, advertising, & information/Marketing & regulations/Food quality/Food safety

<u>*Examples of strategies*</u>

- N4G: Increase networks of SMEs and reduce financial constraints faced by SMEs that produce, distribute, store, transform, market, and retail to make safe and healthy foods accessible
- EAT: Support small and medium farms to produce diverse healthy foods, and provide access to markets so that healthy diets can be affordable
- HLPE-2017: Improve connectivity of local and smallholder farmers to markets, link local farmers to school and institutional feeding program
- CGIAR: Support producers in connecting with consumers through various networks

Food choice (n = 7)

<u>Concepts included</u>

- Knowledge/Acquisition/Consumption

<u>*Examples of strategies*</u>

- DBM: Educate small producers on the benefits of storing some of the produced foods or acquiring other healthy foods so that they can eat healthy foods
- HLPE-2017: Support farmer connectivity so that consumers can get products directly from the farmers and modify food behaviors for healthier foods in schools
- SOFI-2020: Increase access for both producers and consumers to markets through improving physical rural and urban market infrastructure

Action 4. Redesign safety net/social protection programs towards improved nutritional outcome

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Food environment (n = 10)

<u>Concepts included</u>

- Production systems/Retail & markets/Food availability/Food accessibility/Food affordability/Promotion, advertising, & information/Food quality

<u>*Examples of strategies*</u>

- UNS: Establish nutrition criteria on public procurements, offer free meals in public schools, and mitigate the effects of price shocks on the affordability of healthy foods through cash transfers and other social safety nets
- EAT: Establish social protection or social safety nets as nutrition-sensitive interventions to make healthy diets affordable, accessible, and available to women and children and those from low-income households
- HLPE-2020: Strengthen social protection programs that improves quality and quantity of foods, provide timely, adequate, and nutritious food relief during emergencies
- UN-DAN: Improve availability and affordability of healthy foods through social protection and safety nets programs that help increase incomes and provide foods

Food choice (n = 6)

<u>Concepts included</u>

- Preferences/Knowledge/Skills/Acquisition/Distribution/Consumption

<u>*Examples of strategies*</u>

- DBM: Build knowledge and skills to create awareness, shape taste, and motivate consumption of healthy diets through redesigned school feeding programs and guidance on complementary feeding practices, scale up nutrient-sensitive agriculture programs for consumption of diverse foods among poor households, and apply behavior change communication focused on healthy diets while redesigning social safety nets programs
- HLPE-2017: Change consumer perceptions of nutritional value of foods as ensuring social protection programs improve nutritional outcomes
- HLPE-2020: Uphold the right to foods of individuals through support services and social protection including national and international food assistance

Action 5. Reduce food loss and food waste

Food environment (n = 6)

<u>Concepts included</u>

(*continued*)

Action 1. Prioritize agricultural production of a diverse range of nutrient-rich foods

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- Production systems/Food availability/Food accessibility/Food affordability/Promotion, advertising, & information/ Food quality
Examples of strategies

- GLO: Reduce loss, waste, and cost of nutrient-rich products with improved storage, transport, and food sensing technologies along value chains, and enhancing rural market access via infrastructure improvements
- HLPE-2017: Develop infrastructure and technologies for adequate storage and distribution of foods
- UN-DAN: Collaborate and implement practices to reduce food loss and waste among different actors across value chains for availability of healthy diets
- SOFI-2020: Invest in improved storage facilities and postharvest preservation, target production and supply chains where food losses are greatest to improve affordability of healthy foods

Food choice (n = 4)
Concepts included

- Knowledge/Skills/Acquisition/Preparation/Distribution/Consumption
Examples of strategies

- EAT: Reduce food losses and waste by empowering women, building capacity of producers through education, training, and extension services, promoting food loss messages, encourage collaboration among actors along their food supply chains, promoting improved planning of purchases, storage practices, food preparation techniques, and knowledge of how to use leftovers
- GLO: Promote household-level food storage technologies
- HLPE-2020: Reduce food waste at consumer level in industrialized countries

Action 6. Improve food quality and safety

Food environment (n = 10)
    Concepts included

- Production systems/Retails & markets/Food availability/Food accessibility/Food affordability/Food quality/Food safety
Examples of strategies

- UNS: Increase number and capacity of wholesalers and food markets to improve food safety and accessibility, monitor food markets, and encourage food markets to offer healthier options in urban food environment
- GLO: Facilitate improved hygiene and food safety conditions along all food value chains, especially in traditional informal markets
- UN-DAN: Integrate food safety into global food security and nutrition agenda through trade agreements and investment policies including improved availability and access to safe and healthy food in public institutions and reduced use of antimicrobials in food production
- SOFI-2020: Improve food safety and food quality by investing in improved storage, processing, and preservation techniques, using biofortified crops, and developing legislation to ban the use of industrial trans fats in food chains

Food choice (n = 5)
Concepts included

- Preferences/Food acceptability/Acquisition/Consumption
Examples of strategies

- HLPE-2017: Improve tracing of food or ingredients through all stages of production and distribution to connect consumers to producers so that consumers can get safe healthy foods
- CGIAR: Leverage consumer behavior with a whole-of-diet approach to improve food quality, food safety, and increase desirability of healthier foods
- SOFI-2020: Adopt a nutrition-sensitive value chain approach, which helps to reduce preference for more energy dense and highly processed foods

Action 7. Strengthen regulations for advertising and marketing

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Food environment (n = 9)
    Concepts included

- Production systems/Retails & markets/Food availability/Food accessibility/Food affordability/Promotion, advertising, & information/Marketing & regulations/Food quality
Examples of strategies

- GLO: Ensure coherence between trade policies and diet quality, reduce and regulate advertising to children, and promote marketing of sustainable healthy diets
- HLPE-2017: Use retail placement, branding, package design, color, character branding to promote healthy foods, and strengthen regulation that limits advertising and marketing of unhealthy foods and beverages, including breastmilk substitutes
- SOFI-2020: Impose complementary policies to restrict marketing of energy-dense foods and beverages and implement zoning rules to restrict exposures to unhealthy foods near schools
- GAIN: Promote availability of healthy food establishments, restrict availability of unhealthy options, add visual cues for healthy options, issue ordinances against marketing to children, and modify store layout to make healthy the default

Food choice (n = 4)
Concepts included

- Preferences/Knowledge/Convenience/Food acceptability/Acquisition/Preparation/Distribution/Consumption
Examples of strategies

(*continued*)

Action 1. Prioritize agricultural production of a diverse range of nutrient-rich foods

- UNS: Recognize evidence that advertising of foods and beverages affects children's food choices and intake in marketing rules
- HLPE-2017: Promote healthy foods by addressing acceptability and preferences
- GAIN: Increase diversity and consumption of healthy foods, shift desirability and preferences by making healthy options default options.

Action 8. Improve transparency in food labeling

Food environment (n = 6)
  <u>Concepts included</u>

- Retails & markets/Food availability/Food accessibility/Promotion, advertising, & information/Marketing & regulations/Food quality/Food safety

<u>*Examples of strategies*</u>

- DBM: Implement policies and measures to improve food environments by imposing restrictions on improper nutrition labeling of foods
- N4G: Implement national dietary guidelines including nutrition labeling by governments to improve accessibility of safe and healthy foods
- GLO: Upgrade food based dietary guidance to be user friendly, reflect the best science available, and consider issues of sustainability
- SOFI-2020: Regulate food industry by introducing improved nutrition labeling including simplified front-of-pack labeling

Food choice (n = 4)
  <u>Concepts included</u>

- Knowledge/Food acceptability/Consumption

<u>*Examples of strategies*</u>

- DBM: Facilitate healthier food choices form the food environment through nutrition labeling of foods
- SYN: Allow consumers to make informed choices through product labeling including information on impact of products to consumers and create a demand-driven pressure for businesses to achieve sustainable practices and products
- GAIN: Improve consumer food literacy and desirability through visible labeling on food packages

Action 9. Encourage healthier eating through subsidies and promotions of healthy foods and taxes on unhealthy foods

Food environment (n = 10)
  <u>Concepts included</u>

- Production systems/Retails & markets/Food availability/Food accessibility/Food affordability/Promotion, advertising, & information/Marketing & regulations/Food quality/Food safety

<u>*Examples of strategies*</u>

- DBM: Implement policies to impose taxes on energy-dense foods to eliminate promotion and sale of unhealthy foods, and set incentives and rules for retailers and traders to ensure a healthier community food environment
- SYN: Eliminate or redirect subsidies away from products that contribute to obesity, undernutrition, and climate change towards healthy and sustainable food production practices
- SOFI-2020: Revisit subsidy and tax levels in food and agriculture sectors to reduce cost of healthy diets and impose tax on energy-dense foods and beverage of minimal nutritional value to promote healthier diets
- GAIN: Incentivize grocery operators to open stores in food desert or renovate their space to improve accessibility, reduce tax on healthy foods, and regulate prices of fruits and vegetables sold in places where price fluctuation is high to improve affordability

Food choice (n = 8)
  <u>Concepts included</u>

- Convenience/Acquisition/Consumption

<u>*Examples of strategies*</u>

- SYN: Facilitate consumption practices that are healthy and sustainable by redirecting subsidies towards such practices
- HLPE-2017: Encourage consumers to purchase healthy foods through price promotions in mixed and modern food systems and taxation of unhealthy foods
- SOFI-2020: Provide subsidies on purchases of healthy foods, such as fruits and vegetables in grocery stores and discourage consumption of products high in saturated and trans fats, sugars, and salt

Action 10. Create consumer demand for healthy foods (nutrition education & civic engagement)

Food environment (n = 10)
  <u>Concepts included</u>

- Production systems/Retails & markets/Food availability/Food accessibility/Food affordability/Promotion, advertising, & information/Marketing & regulations/Food quality
<u>*Examples of strategies*</u>

- SYN: Create a global Food Fund to support civil society pressure for healthy and sustainable diets and food systems, adopt and institutionalize guidelines on conflicts of interest for policy development and implementation to reduce large commercial interests influence, and strengthen civil society platforms to engage in public policy decisions
- EAT: Integrate healthy diets education into schools, social protection programs, national services, and civil groups to gain national and international commitment for healthy diets from sustainable food systems

(*continued*)

Action 1. Prioritize agricultural production of a diverse range of nutrient-rich foods

- HLPE-2020: Establish and improve nutrition and food system education from global to local levels to support healthy food choices from sustainable food systems
- CGIAR: Integrate gender-responsive participatory elements into crop improvements to address consumer preferences in new crop varieties

Food choice (n = 11)
<u>Concepts included</u>

- Convenience/Acquisition/Consumption

<u>Examples of strategies</u>

- SYN: Invest in strengthening civil society to increase demand for policy action on healthier food environments, and make environmental footprint and health impact product information readily available to consumers for informed decision-making and demand-driven pressure for business practices
- N4G: Establish a sustainable and healthy diets alliance of donor and philanthropist efforts to consolidate and boost demand for healthy foods, and food companies pledge to advance nutrition through practices that promote progress in demand creation and product quality
- HLPE-2017: Incorporate technology (e.g., mobile-based food tracker) to strengthen nutrition education programs, use media campaigns and social behavior change communications to encourage behavior towards healthier diets, and provide dietary advice from context and culturally relevant FBDGs
- SOFI-2020: Implement policy (e.g., awareness campaign and behavior change communication) at the consumer level complemented by integrating comprehensive food and nutrition education (e.g., budgeting, resource management) into national plans and programs (e.g., school curriculum, social protection, and agriculture programs) and food labeling and taxation schemes to influence consumer behavior towards healthy food choices that also reduce food waste

Action 11. Improve acceptability of healthy foods

Food environment (n = 3)
<u>Concepts included</u>

- Production systems/Food affordability/Promotion, advertising, & information/Marketing & regulations/Food safety/ Food quality

<u>Examples of strategies</u>

- GLO: Improving production, storage, and transport systems to decrease cost to consumer and active marketing of sustainable healthy diets
- HLPE-2017: Promote healthy foods through advertisements, marketing, and branding and encourage private sectors to produce packaged foods that are healthy and convenient to cook and eat

Food choice (n = 5)
<u>Concepts included</u>

- Preferences/Knowledge/Skills/Social norms/Convenience/Food acceptability/Acquisition/Preparation/Distribution/ Consumption

<u>Examples of strategies</u>

- EAT: Promote healthy diets that taste good and are culturally appropriate by working together with food service sectors including chefs, through public campaigns about health and sustainability, and peer-group education with chefs
- GLO: Enhance consumer acceptability of healthy foods by reducing their costs and improving food quality
- CGIAR: Leverage consumer behavior with a whole-of-diet approach to increase the desirability of healthy food choices

Action 12. Promote traditional foods and methods that impart nutritional benefits

Food environment (n = 1)
<u>Concepts included</u>

- Production systems/Food availability/Promotion, advertising, & information/Food quality

<u>Examples of strategies</u>

- GAIN: Encourage women to grow indigenous edible plants in community gardens in urban and peri-urban areas, which improves food availability and income through self-employment

Food choice (n = 3)
<u>Concepts included</u>

- Preferences/Knowledge/Skills/Social norms/Convenience/Food acceptability/Preparation/Consumption

<u>Examples of strategies</u>

- SYN: Fund research to understand and save indigenous and traditional knowledge and wisdom about food systems and use of different species of plants, animals, and fisheries
- HLPE-2017: Promote traditional food cultures, food preparation practices, and cooking skills to improve health and nutrition status
- GAIN: Educate women including female entrepreneurs and students about indigenous edible plants, how to grow them, and how to cook healthy plant-based meals

Action 13. Invest in metrics, research, and access to inform policy development

Food environment (n = 10)
<u>Concepts included</u>

- Production systems/Retails & markets/Food availability/Food accessibility/Food affordability/Promotion, advertising, & information/Food quality/Food safety

(*continued on next page*)

(continued)

Action 1. Prioritize agricultural production of a diverse range of nutrient-rich foods

Examples of strategies

- N4G: Integrate guiding principles into relevant policies and programs to link actions to nutrition outcomes and collect and share data by investing in research to inform food systems analysis and policy development to address accessibility and affordability of sustainable healthy diets
- GLO: Improve food storage, transport, markets, and trade through investment in infrastructure and technologies and redesign research and guidelines including introduction of new metrics for improved production
- HLPE-2020: Balance research between public and private sectors to collect and share information during shocks that helps to predict future shocks and improve investment in infrastructure for markets and storage to support decentralization of diverse foods and to ensure equitable access to inputs, services, and new technologies
- UN-DAN: Establish national nutrition targets by the governments, strengthen monitoring mechanisms to track progress in achieving national targets, focus on research and evidence generation around nutrition, build capacity and workforce within a country to improve nutritional outcomes, and encourage public and private investment policies in food sector

Food choice (n = 4)

Concepts included

- Knowledge/Consumption

Examples of strategies

- SYN: Fund research to understand and save indigenous and traditional knowledge and wisdom about food systems and use of different species of plants, animals, and fisheries
- N4G: Boost demand for healthy foods through investments by public sectors and philanthropic organizations to promote healthy and sustainable food choices
- SOFI-2020: Support public investment in demand-driven research and extension to facilitate sharing of knowledge, best practices, and innovations for increased production and productivity

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