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Scoping Review

Consumer attitudes and behaviors toward more sustainable diets: a scoping review

Tara A. Kenny, Jayne V. Woodside, Ivan J. Perry, and Janas M. Harrington

There is an urgent need to move toward more sustainable diets. Although this will require radical and systemic changes across food systems, altering consumer ideologies and practices is essential to garner support for such actions. In this scoping review, the evidence on consumers' attitudes and behaviors toward more sustainable diets is synthesized and a range of factors, considerations, and proposed strategies are presented that can contribute to building the societal-level support for urgent and systems-level changes. The findings suggest that consumers, insofar as they are interested in sustainability and have the capacity to engage with the concept, primarily approach the concept of sustainable diet from a human health perspective. However, the interconnectedness of human health and well-being with environmental health is poorly understood and under-researched in the context of consumer behaviors and attitudes toward sustainable diets. This highlights the need for (1) sustained efforts from public health professionals to encourage a realignment of the term sustainable diet *with its multidimensional meaning by championing an ecological public health approach in all efforts aimed at promoting more sustainable consumption, from awareness raising to policy development; (2) a broader research lens focused on the multidimensional concept of sustainability in the literature exploring consumer attitudes and behaviors; and (3) the development of multidisciplinary, clear, and evidence-based sustainable-eating messages, including holistic sustainable dietary guidance, to address knowledge gaps, minimize conflicting narratives, and build consumer agency. The findings contribute to understanding how support can be generated for the necessary structural and system-level changes required to support behavior change.*

INTRODUCTION

Global dietary patterns are not sustainable.[1,2] There is now broad consensus that consumers must be encouraged to shift toward sustainable diets, defined as "diets with low environmental impacts which contribute to food and nutrition security and to healthy life for present and future generations. Sustainable diets are protective and respectful of biodiversity and ecosystems, culturally acceptable, accessible, economically fair and affordable; nutritionally adequate, safe and healthy; while optimizing natural and human resources."[3]

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Although the composition of such diets will vary according to country context, a reduction in the reliance on animal-based foods, especially ruminant meat, and an increase in reliance on whole plant–based foods will remain central in high-income countries,[4,5] where the overconsumption of animal proteins (particularly red meat), discretionary foods, and ultra-processed foods (UPFs) are commonplace.[6,7]

Transitioning toward more sustainable diets will require fundamental changes in how the food system is organized, controlled, and regulated to ensure alignment with human and environmental health, to improve democratic accountability, to promote food citizenship, and to address existing power imbalances.[4,8–10] Thus, multisectoral efforts and a combination of top-down policy interventions (eg, incentivizing more sustainable food production and consumption along with bottom-up community-based approaches[9]) will be essential to progress toward more-sustainable diets. A key focus of these approaches will likely be on encouraging and supporting consumer behaviors and attitudes more aligned with sustainable dietary practices. However, any efforts to shift consumption patterns will need to account for the influences underpinning dietary practices if "population-wide, long-lasting changes"[9(p825)] are to be achieved, including sociocultural factors.[1]

The purpose of this scoping review is to synthesize the empirical evidence on consumers' attitudes and behaviors toward more-sustainable diets to assist the development of strategies encouraging behavior change and to contribute to understanding how support for structural and system-level changes can be generated at the societal level. This is achieved by exploring the literature to identify the range of factors influencing the uptake of more sustainable dietary practices, including how consumers conceptualize sustainable diets, and consumers' knowledge gaps. In this review, we also identify proposed strategies that can be used by policymakers to support the transition toward more-sustainable diets.

METHODS

Using the key search terms "Sustainable diets AND attitudes AND behavior," a search for English-language articles published in peer-reviewed journals was conducted from January 1, 2012, and April 30, 2021, across 4 databases: Web of Science, Science Direct, PubMed, and Scopus. The initial search resulted in 1006 articles, of which 322 contained relevant titles and key terms. After removing duplicates, an initial eligibility screening of 256 articles was carried out by 2 independent researchers using Rayyan software, which yielded 154 articles. Conflicts about the inclusion of studies in the next phase of screening were resolved through discussion. A final round of full text screening resulted in 54 empirical studies (Figure 1) that met the inclusion criteria.

Studies that focused solely on lower-income countries, a particular cohort of the population (ie, youth or older populations), alternative proteins, specific dietary patterns or characteristics (eg, organic, Mediterranean, or Nordic diets), sustainable diet interventions and labelling, and research carried out in restaurants, fast-food, or retail settings were excluded. Metadata were extracted from each of the 54 articles on title, publication year, journal, country of study, methods, focus of study, relevance to research question, definition of sustainable diets used, and limitations (see Table S1 in the Supporting Information online).

The included articles were uploaded to Nvivo (version 12) and coded inductively on the basis of the findings related to consumers' behaviors and attitudes toward sustainable diets. Factors encouraging or prohibiting more-sustainable diets were documented and reorganized to illustrate the level at which these influences operate (see Table S2 in the Supporting Information online). Suggested actions and strategies to encourage more-sustainable diets were also tabled and reorganized by the research team into 3 target areas: policy, food environment, and research (Table 1); education, skills, and awareness raising (Table 2); and messaging considerations (Table 3).

RESULTS

Most studies were published between January 2016 and April 2021 (n = 48), used quantitative methods (n = 37), and were carried out in European counties (n = 35). Twenty-four papers (44%) focused primarily on the topics of meat consumption, reduction, and avoidance (beliefs, attitudes, motivations, and willingness to reduce consumption). In these 24 studies, 2 included vegetarians and vegan consumers in their study design and 7 also explored consumer awareness and knowledge of the environmental impacts of meat consumption. The remaining articles (n = 30) focused on attitudes and behaviors toward sustainable diets more generally and included studies that explored consumer perceptions and knowledge (n = 11); consumers' values, motivations, and related eating patterns (n = 11); and sustainable diet determinants and consumer concerns (n = 8).

The rationale for all articles was centered mostly on human and environmental health and only 30% of articles (n = 16) provided a definition of a sustainable diet that extended beyond a human and environmental

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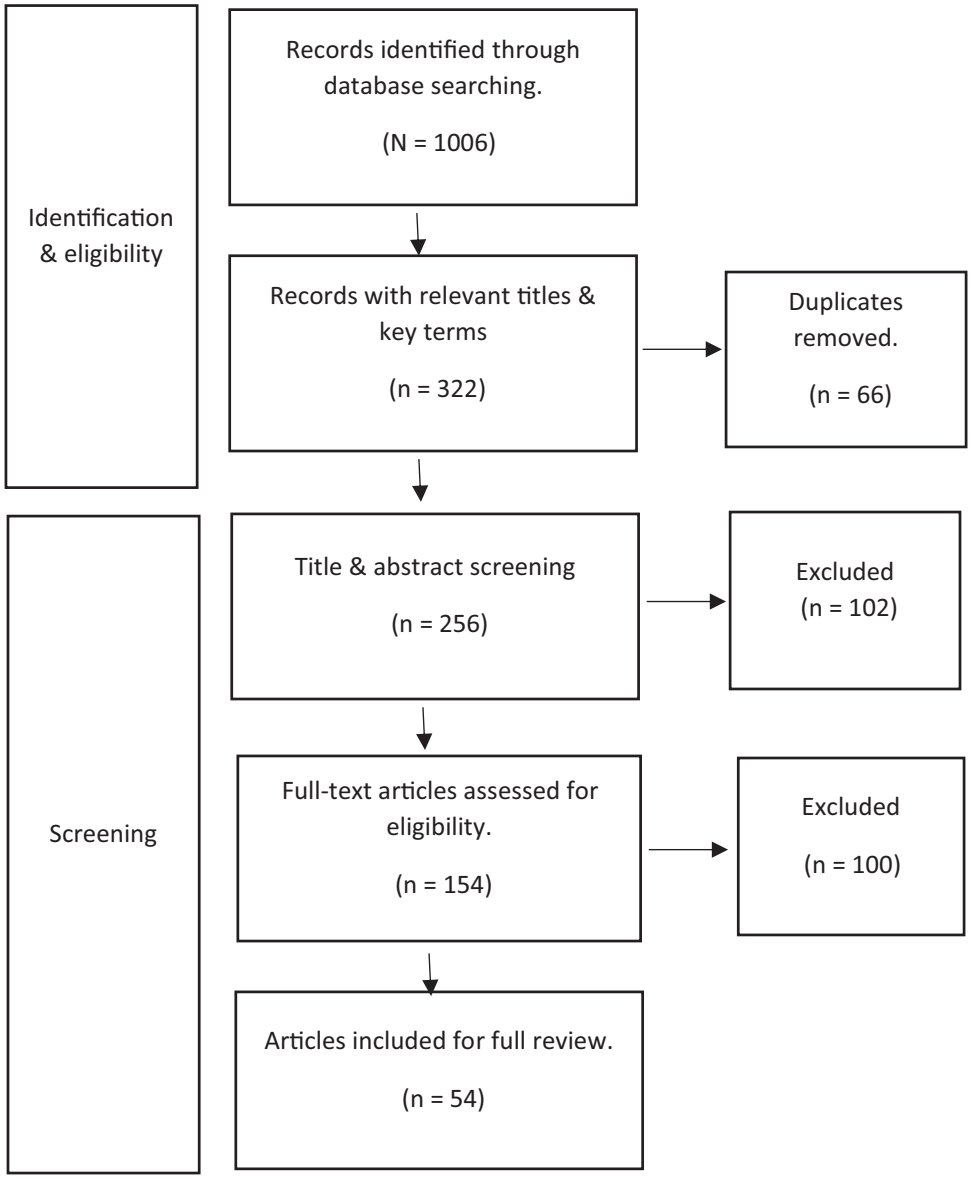

Figure 1 **Literature selection process.**

health framing (see supplementary materials, data 1 [Table S1 in the Supporting Information online]). Furthermore, overrepresentation of women and well-educated and urban populations was observed in 22% of the included studies, but particularly in articles exploring sustainable diets more generally (30%).

Dietary determinants: structural and intermediary influences

As illustrated in Figure 2, and presented in further detail in the supplementary materials (see Table S2 in the Supporting Information online), the factors influencing the uptake of more-sustainable diets operate at both the structural and intermediary levels. The structural determinants refer to socioeconomic and political circumstances shaping diets, whereas intermediary determinants relate to the material circumstances, behaviors, and psychosocial factors influencing diets.[61] The following results present an overview of how these determinants interact and influence the adoption of more sustainable diets, including how consumers understand the concept of sustainable diets, before outlining 4 broad strategies that can be pursued to facilitate and support consumer behavior change.

The knowledge, attitudes, and behaviors of consumers are influenced by several sociodemographic variables.[62] Sex, level of education,[19,20,46,48,51,58,62] and income[24,46,51] affect the likelihood of consumers engaging with more-sustainable dietary behaviors. Women are reportedly more engaged with sustainability dietary

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Table 1 **Actions proposed in the literature to address structural challenges**

Focus	Food environment, policy, and research: actions and applicable references
Policy instruments	Moving policy and efforts beyond awareness raising: making the more sustainable choice the easier choice, supporting government policies, regulation, true cost accounting[11–18]
	Economic incentives and disincentives (ie, reducing price of organic food, healthier foods, subsidizing local agriculture and healthier foods, taxing less-sustainable foods)[13,17,19–23]
	Addressing sociocultural, economic, and physical barriers[17,24–29]
	Incorporating sustainability in dietary guidelines[19,25,30–32]
	Policies clarifying and outlining how our food consumption affects the future of the planet[33]
Food environment	Social opportunities and exposure: repeated exposures to meat alternatives, greater support for meatless-day campaigns in public institutions, exposing children to meatless meals from an early age in institutional settings[11,14,21,22,34–36]
	Strategies targeting various segments of the population[23,36–39]
	Sustainability labelling and environmental impact labelling[17,34,40,41]
	Formulating appealing, convenient, affordable meat alternatives[21,34,42]
	Creating opportunities to eat sustainably (eg, demonstration sites, schools, institutions, restaurants)[12,43]
	More research "upstream" focused on food provisioning and production systems, food environments, social and cultural contexts[12,20,44,45,29]
	Choice editing (ie, limiting the choice available to consumers)[28]
Research and monitoring	Research that captures the additional dimensions of sustainable diets (social, cultural, economic)[20,23,40]
	More research on what information on a sustainable eating pattern should be presented, how and by whom, to gain consumer trust should be carried out before the information is disseminated.[27]
	Regular monitoring of consumption practices and attitudes[41]
	Exploring how, who, and what is shaping media discourse[3]
	Campaigns informed by studies based on randomized and national representative samples[23]

Table 2 **Building consumer knowledge and awareness**

Focus	Developing education, skills, and awareness: actions and applicable references
Increase awareness of:	Social and environmental representation of sustainability; connections and relationships imbued within the concept[17,25,33,46,47]
	Ecological and health impacts related to diets, most especially animal-based foods[14,16,19,23,25,27,33,34,38,48–50]
	Long-term consequences of high levels of meat consumption[32]
	Co-benefits: addressing the environmental sustainability of food choices as part of public health messaging to promote healthier and more sustainable diets[11,27,34,35,37,48,51–53]
	Food waste and how to use leftovers[19,43]
Education and information provision	Educating consumers before strong values are formed (ie, at the primary level). Creating opportunities for younger populations to visit farms and learn about sustainable production, education in schools at a young age[17,20,37,53]
	Using education and activities targeting increased moral engagement as avenues for increasing the consumption of sustainable foods[34,54]
	Innovative advertising strategies, especially for fruit and vegetables[17]
Knowledge and skills	Increasing knowledge about plant-based alternatives, more-sustainable food choices, healthier and more-sustainable food habits[20,34,40]
	Improving consumers' nutritional knowledge[19,20]
	Developing food skills: purchasing, preparing, cooking, and eating[14,17,19,41,43]
Perceptions	Enhancing perceived consumer effectiveness[25,27,38,46]
	Improving consumer perceptions of meat alternatives[21,34,42,55]
Multipronged	Public-health nutrition programs based on the key considerations within the concept of sustainable diets[25]

concerns and are more likely than their male counterparts to act accordingly.[25,33,40,46,63] Women are also more likely to associate meat with ecological and animal welfare concerns[21,25,30,31] and are more open to information about both the impacts and benefits of reducing meat consumption.[64] However, although women are more open to adopting meatless meals,[42] and thus are a suggested target group for interventions and campaigns,[33] qualitative research highlights that this interest can be hampered by less-willing male partners and children.[26,34,44] On the other hand, there is also evidence of men reducing their meat consumption due to the influence of a vegetarian partner.[26]

The relationship between higher educational attainment and more-sustainable dietary practices has also been observed in several studies,[19,40,48,51,52,59] and other

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Table 3 **Considerations outlined in the literature for developing clear and targeted consumer messaging**

Focus	Messaging consideration and strategies: actions and applicable references
Message content: general abstract	Highlight relationship between traditionality, sustainability, and health[15,56]
	Communicating social, economic, cultural, and environmental representation of sustainability; connections and relationships imbued within the concept[17,25,33,41,46,47]
Message: general: impact	Using environmental implications that people know about (eg, air pollution, water pollution, "this burger equates to X no. of car journeys")[34]
	Highlight key food behaviors that incur the highest environmental impact and ensure that messaging is simple to help consumers navigate some of the potential trade-offs[27]
	Avoiding oversimplification[14,19]
	Targeted health and environmental awareness programs and campaigns[22,35,39]
Message source	Community-based social marketing, role modelling[11,21,22]
Message target	Targeting women (who are more open to change, and as duty bearers of shopping and cooking in a household), while being mindful of the role of additional household and family members in influencing decision-making[33,34,44]
	Tailoring messages to different values[23,36–39]
Informational messages	Highlight limitations on food choices (ie, seasonal unavailability of food)[43]
	Messages aimed at promoting more-sustainable eating patterns need to ensure that participants are aware that their individual food behaviors are important in helping preserve the environment (improving consumer effectiveness)[27,38]
	Reducing meat content by adding more whole-food, plant-based foods in meals. For instance, adding lentils to mince meat dishes[22,44,52,57]
	Promoting flexitarian diets[13,32,45]
	Provide recipes for plant-based meals, information on simpler ways of preparing plant-based meals[35,39,42,44,48]
	Distinguishing between processed and highly and ultra-processed foods[14]
	Smaller portions, reduction rather than exclusion, "eat less," "eat less but better." "Quality (organic, ethically produced) rather than quantity"[14,22,43,44,48,52]
	Addressing common inaccurate beliefs (eg, meat is essential for adults to ensure a healthy diet, plant-based meals are inadequate to maintain a heathy diet)[11,16,42,48]
Belief modification	Clear and relatable messaging based on common beliefs in the population or counternarratives[16,34,48]
	Encouraging open-mindedness toward other eating styles (eg, vegetables as a main rather than a side)[43]
	Specific advice about preferred foods to eat when reducing meat[48,52]
	Addressing values in sustainable diet practices as part of dietary counselling and health and nutrition promotion programming[25,37]
	Improved transparency and clarity: health and/or sustainability labelling programs supported by detailed information about what exactly the label covers[17,40,44]
Message: appeal: rational, emotional, and moral	Addressing moral defense (the 4 n's: that meat is natural, necessary, normal, and nice); positive attitudes toward meat[11,16,32,34,42,48]
	Emphasizing health benefits of sustainable diets[13,14,27,37,50,52,58]
	Addressing the underestimation of the high environmental impact of ruminant meats, dairy, cured meats[16,49]
	Messages that activate social norms and emotional involvement[58]
	Promoting animal-welfare ethical values[59,60]

additional studies suggest that the more educated a person is, the more likely they are to believe that current levels meat production and consumption are unsustainable[30,65] and to purchase meat replacements.[52] Links between place of residence and sustainable dietary practices, awareness, and openness to alternative consumption patterns have also been observed. For example, in Portugal, those living in urban areas are more knowledgeable about environmental implications associated with meat production, more familiar with meat alternatives, and more open to reducing meat consumption compared with those living in rural areas.[55] Research carried out in Scotland suggests that personal links to the agricultural economy are associated with less familiarity with the concept of sustainable diets and a lower willingness to reduce meat consumption.[42] In contrast, another Scotland-based study reported no location- or sex-based differences in resistance to reducing meat consumption.[26] The variation in findings is likely attributed to the specific sociocultural and economic contexts in which these studies took place, in addition to differing research designs and questions.

The social, cultural, economic, and informational environments in which people live can also support existing consumption patterns. Meat consumption is tied to various social values such as pleasure, identity, heritage, and cultural norms[11,26,34,42,53,62] and, in many high-income countries, meat is perceived as central and necessary to ensure a "proper dinner."[34,48,53] Although this idea is deeply rooted in tradition and rationalized

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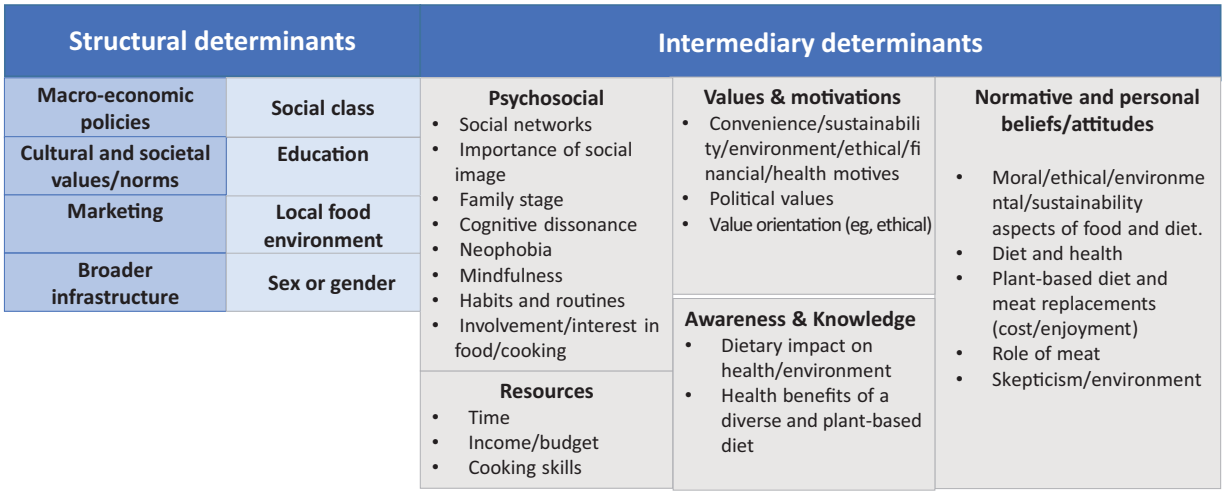

Figure 2 **Overview of factors influencing more or less sustainable diets.**

as "this is how I was raised,"[35] it is also evident in national discourses and supported by economic interests. For instance, in Norway,[53] New Zealand,[44] and the United Kingdom,[57] the influence of the agricultural sector and institutional discourses on national narratives concerning sustainability was noted as at odds with a shift toward less meat consumption. In the case of Norway, this was offered as a partial explanation of why consumers underestimate the environmental impacts of meat consumption and was noted as a barrier to reducing current consumption levels.[53] Kemper[43] reported a lack of trust in both advice from the New Zealand government and the food supply chain more generally. In Scotland, qualitative findings highlight confusion and skepticism about the amounts of red and processed meat that can be consumed as part of healthy diet and scientific evidence on the health and environmental impacts of red and processed meat, because of perceived conflicts of interest and contradictory messages.[34] These factors contribute to making an already-complex food environment, with multiple and often conflicting messaging, difficult for consumers to navigate. For example, 1 large-scale study (n = 22,934) identified how French consumers are "torn between purchasing animal-based products to follow [national] dietary guidelines or limit purchase for environmental issues"[31] and that these dilemmas were more prominent when purchasing meat rather than dairy foods.

Perceptions, knowledge, and awareness of more-sustainable dietary practices

The term *sustainable diet* has several meanings for consumers, including consuming a healthy, balanced diet[12,13,19,24,40,41,47,49]; encompassing natural, organic,[12,24,33,37,40,41,43,47,49] fresh,[33] local, and seasonal[12,33,43,49] plant-based whole foods[33,37,47]; less but better-quality meat consumption[12,43]; and overall better-quality diets.[24] Although preserving the environment is a characteristic of sustainable diets,[41,47,49] health motivations and concerns are more salient in comparison with other components.[13,14,47,66] Dietary carbon, water, and land footprints, along with the social and cultural impacts of diets, are generally not considered when conceptualizing sustainable diets.[14,25,33,40,47] And even in countries where land and water footprints are a consumer concern,[13] health and price are prioritized[13,14,19,25,27,48,53,67] over environmental,[12–14,28,32,41] sociocultural, and economic concerns.[12,47] Evidence from Poland suggests that consumers are unfamiliar with the term *sustainable diets* and those that are have an incomplete understanding of its meaning; for instance, interpreting a sustainable diet as an "energy-balanced diet."[25] Similarly, the findings from a recent a multicountry study suggest that consumers are not "fully aware of the overall importance"[24] of the term.

Correspondingly, the ecological impacts stemming from diets are not well understood,[33] with pro-environmental behaviors associated more with energy saving at home, recycling, reducing plastic use, and food waste rather than change in dietary behaviors.[14,15] Confusion is also evident with respect to both the terminology used to capture and measure the ecological impacts of diets[33] and in discerning which dietary behaviors carry the greatest environmental burden. For instance, in Australia, plastic waste and felling trees were perceived to have a larger impact on the environment than food behaviors.[27] In the United Kingdom, choosing organic food and "prioritizing plant-based proteins"[19] were perceived to have the lowest environmental benefits, whereas supporting locally grown produce, reducing the consumption of air-freighted foods,

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and reducing food waste were perceived as the most beneficial.

The link between food behaviors and climate change is also underestimated, with several studies reporting an overall low awareness of environmental impacts stemming from meat production and consumption.[11,15,16,26,27,30,34,35,38,42,50,52,53] For example, for more than a third of participants in UK and Belgian studies completed in 2015 and 2017, respectively, livestock farming was not linked to climate concerns,[35] nor was eating fewer animal products linked to a reduction in the impact of climate change.[30] Similar findings were reported in New Zealand, where the environmental benefits of eating less meat received a lower rating in comparison other sustainable dietary behaviors.[16] More recent evidence supports that the ecological impacts stemming from dairy,[27,33] fish,[33] and ruminant meat[15,33,49] tend to be underestimated, whereas the impact of food miles[27] and the origin and degree of healthiness associated with cheese and cured meat were overestimated.[49]

Beliefs, values, and motivations supporting or inhibiting a reduction in meat intake

Across multiple high-income countries, the willingness to reduce meat consumption is low[38,48,53,67] with nondietary-related changes perceived as more acceptable than either reducing or replacing meat in meals.[19,26,34] Even when consumers are presented with information about the negative impacts stemming from meat production and consumption, individuals who consume meat regularly are less receptive to reducing consumption, and various rationales are used to rationalize maintaining current consumption levels. According to research carried out in the United Kingdom,[26] Australia,[67] and Portugal,[64] these justifications include the beliefs that meat is necessary, healthy, and pleasurable; that reducing consumption is unrealistic or inaccessible; and that the impacts stemming from meat production are neither the fault nor responsibility of the individual. This can be complicated further by cognitive dissonance, via defense and denial mechanisms, preventing people from "feeling emotionally involved and thus to changing meat eating behavior."[11(p1267)] For example, the avoidance of information pertaining to the negative consequences of meat production and consumption may result in "emotionally distressing reactions."[11(p1267)]

Consumers who believe in the climatic and environmental impacts of meat consumption are also more likely to reduce their meat consumption.[53] Indeed, several studies identified that consumers with a higher perception of consumer effectiveness[46] and positive attitudes toward sustainable dietary practices were more likely and willing to engage in more sustainable dietary behaviors.[19,40,51,54,63] Moreover, positive attitudes toward protecting the environment are also associated with higher levels of awareness and knowledge of the relationship between food and the environment.[51,52,66]

Consumers with a general orientation toward ethics and prosumerism (ie, those who favor self-sufficiency) and who value naturalness and health eat more plant-based meals but also more fish in comparison with those who value social image, convenience, and pleasure.[62] Those who place a higher value on food choice (ie, having as many choices as possible) are less willing to reduce meat consumption and consume fewer plant-based meals with no reported difference in fish consumption.[52] However, additional research suggests that people motivated by taste and convenience exhibit low environmental and health concerns, tend to consume an "unbalanced diet,"[41] overconsume foods high in salt, sugar, and saturated fat, and have a higher body mass index.[20]

For those actively reducing meat intake, some research suggests health as the primary motivation, followed by environmental and animal welfare concerns, whereas abstainers prioritize animal welfare and the environment as the driving motivations.[16] Similar findings are reported elsewhere, with those consuming meat less frequently more likely to be concerned with animal welfare.[65] In the New Zealand context, however, cost was identified as the strongest motivation to reduce meat consumption, followed by health benefits, taste, animal welfare, weight control, and the environment, in that order. In line with additional research,[39,64] the strength of these motivations varied by the person's meat-eating habits.[16]

Despite the synergies between diets conducive to both human and wider environmental health,[25,31,33,41,48,49,51] "healthy" diets are perceived as cheaper, tastier, easier to prepare and access, and more nutritious in comparison with a mostly plant-based and "sustainable" diet.[40] And for most consumers, dietary motivations, whether influenced by sustainability concerns or otherwise, are centered on cost and health.[11,20,22,30,35,39,41,42,44,48,52,57,62] In terms of encouraging a reduction in meat consumption, lack of familiarity with meat alternatives,[34,42] lack of skills and knowledge of how to prepare meals without meat,[11,35,39,42,44,45] a perceived high cost of alternative foods,[20,39] low awareness of the impact of meat, and low availability of meatless options in the workplace[22] all inhibit the transition toward more plant-based diets. It is also noteworthy that although commensality (ie, eating with others) encourages social bonding, it can inhibit dietary change at home,[26,44,57] at work,[22] and at social gatherings.[57]

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Despite the various structural and intermediary determinants influencing dietary behavior toward more, or less, sustainable diets, the literature proposes several broad strategies to encourage and support more sustainable dietary behaviors.

Addressing structural barriers: accessibility and information provision

Drawing on the philosophies of "gourmets," Schösler and de Boer[13] suggest several practices evident in this community that can encourage a more sustainable diet. These include the attention given to pleasure, taste, and social relatedness, which can be encouraged by promoting quality rather than quantity, urging people to explore additional eating styles, and building food competences, as well as an acceptance of the natural limitations of seasons.[43] Nonetheless, for some mainstream consumers, sustainability is not an attribute that carries weight in light of other more immediate financial concerns.[28] In the Australian context, food practices are described as "household budget and nourishment practices"[28(p67)] first and foremost, which makes a sustainable diet difficult, if not impossible, for low-income families and individuals in the absence of addressing economic inequalities such as low income. Additional research suggests that people living in a less wealthy neighborhood do not associate plant-based diets with any well-being domains (ie, physical, social, human, financial, *eudaimonia* or overall well-being).[29]

Income also plays a role in determining what is chosen as a substitute and in the experience of navigating health vs environment dilemmas. In the United States, research indicates that low-income populations tend to reduce the purchase of poultry and seafood rather than of red meat,[48] and research in France suggests that lower-income groups report more health vs environment dilemmas than do higher-income groups.[31] In the UK context, social-class differences were not found in the willingness to reduce meat consumption; however, income is a critical factor in terms of capability to enact change[26] and, thus, a central consideration in encouraging more sustainable dietary patterns.[17,23,28]

As highlighted in an Australian study, although consumers may want to support local food production and purchase lower impact, fresh, and nutritious food, and understand the benefits of doing so, highly processed foods are more accessible, cheaper, and allow for food budgets to support other nonflexible costs, such as housing.[28] Thus, the discrepancies between desired behaviors, more healthy and sustainable dietary practices, and actual behaviors can be attributed to multiple structural factors, such as low mobility (eg, access to shops, markets, and transport), time pressures, social dynamics, economic restrictions,[12,17,25,28,41] and market forces reinforcing existing consumption patterns.[11,36]

Increasing accessibility to more-sustainable food choices in price, availability, and marketing would encourage and enable consumers to practice more-sustainable eating behaviors.[17] However, reducing the cost of such foods would require government subsidization rather than price reductions,[17,19] along with a range of additional policy actions targeting various levels of the food environment, such as those identified in Tables 1 and 2.

Considering the abundance of low-cost meat products in Western food environments,[11] along with a multitude of sociocultural and economic barriers, information alone is unlikely to change behavior.[17,22,27,34,50,53] The limited efficacy of the Attitude, Behavior, and Change paradigm, favored by public policy in contending with complexities in which food choices are made, suggests that the notion of consumer sovereignty should be challenged in favor of "large-scale dietary change."[34(p143)] Evidence from Canada suggests that an increase in the cost of meat results in less meat consumption,[65] and although such measures are likely necessary for large-scale dietary change in high-income countries,[11] fiscal measures are the least supported structural change aimed at reducing consumption.[16] Therefore, despite the limitations of informational campaigns, the absence of awareness about the ecological impacts of diets, such structural changes, are unlikely to be accepted by the public.[16,34,50] However, for some populations, increased awareness of the relationship between food and sustainability concerns can also lessen the gap between intention and behavior.[17,40]

Several authors advocate increasing the awareness of the ecological impacts stemming from meat production and consumption,[27,38,48] along with building consumers' knowledge and understanding of the various components encompassed within the term *sustainable diets*[17,25,41,47] (see Table 2 for additional education, skills, and awareness strategies identified in the literature). At the same time, addressing the cultural, social, economic, and physical barriers in society also is a prerequisite for moving toward more-sustainable diets.[17,24,25,27–29] In short, multiple strategies targeting various segments of the population[17,54,57,66] and multiple levels of the food environment[11,17] are required to support more sustainable diets.

Accounting for sociocultural and political barriers in research; appealing to emotions, attitudes, and social norms; and increasing exposure to plant-based meals

In the current consumer behavior literature on sustainable diets, health remains the dominant focus,[23,57] and

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several studies call for more attention to be paid to the sociopolitical and cultural constraints influencing diets.[26,44] For many consumers, social and cultural norms maintain, rather than disrupt, ideas supporting current meat consumption levels, and some research suggests changing norms using opinion leaders, role models, and community social marketing to assist in establishing new social and cultural norms.[11,22,44] There is also evidence to support that emotional and symbolic, rather than rational, messaging, may be a better approach to address cognitive dissonance.[11] This is also encouraged by McBey et al,[55] who suggest using wartime rhetoric to respond to the climate emergency and campaigning efforts focusing on animal welfare concerns specifically.

Although still in the minority, an increasing number of people have adopted flexitarian, vegetarian, and vegan diets in recent years, and the rejection of relationism (described as an animal ethical position that distinguishes farm animals from other animals [eg, companion or wild][67]) seems to be a factor in this regard. For instance, in Germany, a quarter of the population does not differentiate between farm and companion animals, and this group of consumers has the highest number of flexitarians and vegetarians.[67] Specific interventions targeting ethical, moral, attitudes, and social norms, along with raising awareness of the link between people, planet, and food are key recommendations in the literature to move toward more-sustainable and healthy diets.[11,17,20,23,37,54] One such strategy to shift social norms and attitudes is through increased exposure to more plant-based meals beginning at an early age.[34] Indeed, several articles recommend increasing the availability of, and exposure to, plant-based meals.[11,44,47,48,52,57,67]

Encouraging meat alternatives, flexitarianism, and substitution

Introducing consumers to and familiarizing them with meat alternatives are considered important elements of the transition toward diets containing less meat. Despite a growing market, the consumption of alternative meat products is generally low,[21,52,57] even in populations who have actively reduced their consumption of meat.[22,48] Low familiarity, use, and sensory appeal of meat substitutes are some of factors attributed to lower acceptance of these products by the general public,[14,21,45] in addition to the perception of meat alternatives as unnatural, unhealthy,[21,54] and ultra-processed.[44] The literature suggests addressing these concerns by promoting more whole-food options[48] and creating appealing and affordable meat alternatives may encourage further consumption.[34] Other proposals to encourage a reduced meat diet include (1) challenging cultural norms and existing meal formats, (2) incremental change through substitutes to de-routinize meat as a staple of every meal, (3) introducing less-familiar food in combination with routinized foods, and (4) focusing on promoting portion-size awareness as a supplement to substitution practices.[45]

Although reduction rather than the exclusion of meat is more acceptable to consumers,[13,22] an "eat less" message is counterintuitive to the operations of the food industry and, therefore, will require concerted societal and government backing.[52] At the household level, reduction rather than exclusion is the approach currently taken by families actively reducing meat consumption, and the methods used vary by life-cycle stage,[44] interest in cooking,[35] and type of meal being prepared,[57] all of which are important considerations when designing campaigns to encourage reduction. For instance, some research suggests that young adults and families exhibit more creativity and exploration when creating meals. The emphasis is placed on cooking meals from other cultures and trying new recipes.[43,44,60] By contrast, retirees tend to reduce by portion size and substitute with fish and other meats.[44] Other strategies used by households included swapping meats for fish or other animal-based products, planning meals in advance, and reducing the quantity of meat in meals such as curries and stews.[57]

Labelling, clear context-specific messaging, addressing counternarratives and targeted approaches

Godin and Sahakian[12] point out that there is no hierarchy attached to the idea of sustainable diets, ideas contained within the concept of sustainable diets are not fixed, and they are emotionally charged, often overlap, and can conflict with other elements. For instance, local food vs organic food or less meat and better meat vs no meat and navigating these tensions are unfairly left to the consumer, who is perceived as the responsible agent in these matters.[12] Thus, clear information and advice to assist the consumer in assessing and navigating these dilemmas will be necessary.[27] Although labelling is a valuable tool to assist the transition toward more sustainable diets,[17,40,41] some caveats and considerations apply, 1 being that labelling is more likely to be used by consumers with a higher level of perceived consumer effectiveness and who are already concerned about both environmental and ethical or societal dimensions.[46] This is suggestive that building awareness, knowledge, and regard for the impacts of diets are also precursors to sustainability labelling in addition to

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campaigns that maintain a balance between communicating key messages clearly without oversimplifying.

For instance, a potential weakness highlighted in the meatless-day strategy relates to its inability to communicate that overall animal-based protein ought to be reduced and plant-based alternatives pursued. Promoting "veggie days" was proposed as means to communicate this message more clearly.[52] Several additional studies suggest that specific guidance on preferred foods to consume when reducing meat consumption along with recipes for plant-based meals[35,39,42,44] would assist consumers in choosing and preparing more sustainable meals. A more-complex example is that of seafoods, because although the associated greenhouse-gas emissions are lower, additional impacts such as biodiversity loss have yet to be considered in sustainability messaging.[33]

Some consumers are already engaging in multiple actions related to more sustainable diets, such as reducing food waste[19,56] and avoiding excess packaging.[19] However, because of the ambiguousness of the term *excess packaging*, it has been suggested that recommendations pertaining to more specific behaviors, such as avoiding highly processed foods and buying in smaller quantities,[19] may be more beneficial. Hoek et al[14] echoed this call for more precise messaging along with educating consumers to distinguish between processed and highly processed foods. Table 3 provides an overview of some additional and specific messaging considerations identified in the literature.

A call to return to more traditional diets that, in some instances, do not align with sustainability concerns, may also require some consideration.[15,20] The influence of industrialized food systems favoring uniformity and standardization, and the commercialization of "traditional" recipes by hypermarkets renders some traditional dietary patterns a problematic reference point for sustainable diets.[32] On the other hand, drawing on certain aspects of traditional diets can align with more sustainable diets and dietary practices. However, this may depend on the farming systems operating in countries and traditional food cultures. For example, in the Transylvanian region of Romania, most people are interested in consuming quality, locally produced fruits and vegetables, which are central to the traditional food culture in this region in both production and consumption.[56] Likewise, in the Brazilian context, some traditional diets are based on foods such as fruits, vegetables, beans, and rice, which are all widely produced and consumed throughout Brazil.[47] Thus, the call to return to traditional diets to encourage more sustainable dietary practices may require country-specific consideration and a wider appreciation of national food systems and their influence on food cultures and dietary patterns.

Offering counternarratives to the positive attributes associated with the elevated status of meat from health and cultural perspectives has also been noted as a potential strategy worth pursuing.[16,48] For countries with strong agricultural industries, exploring cultural and media discourses about meat and dairy consumption may help identify what these narratives are and help develop positive counter messages, particularly in the context of sustainable food–based dietary guidelines.[44] Examples include outlining that sufficiently planned vegetarian and vegan diets can be nutritionally adequate with consideration of the micronutrients of concern, and that although plant-based diets may contain less protein, the average person currently consumes 20% to 60% more protein than is required for a healthy diet.[48] However, as outlined earlier, for consumers with a high attachment to meat, information alone will likely be insufficient to change behavior or intentions and may even be counterproductive by furthering entrenchment of the behaviors and attitudes in this population cohort. Thus, indirect and structural approaches that facilitate the mainstreaming of plant-based diets may be a better approach.[11,53,64]

DISCUSSION

Realigning the term *sustainable diet* with its multidimensional definition and awareness building

In this review, we identified a range of factors influencing the uptake of more sustainable dietary practices, including how consumers conceptualize sustainable diets and consumers' knowledge gaps. The literature varies somewhat in terms of which socioeconomic factors determine more sustainable dietary practices, and this is likely attributed to the various socioeconomic and cultural contexts within and between regions and countries. Nonetheless, regardless of context, there is broad consensus that people's knowledge of the relationship between diets and the environment is low and that environmental, along with cultural and social, impacts (where considered in the research design) are not important dietary motivations.

The absence of human health from the layperson's understanding of the term *sustainable diets* led to the Food and Agricultural Organization and World Health Organization to reaffirm the position of health as a core component of sustainable diets, by communicating *sustainable healthy diets* in their 2019 *Sustainable Healthy Diets: Guiding Principles* report.[69] The literature explored here suggests that human health is now central to the idea of sustainable diets, both in research exploring the topic of sustainable diets[20,23] and in consumers' conceptualization of what a sustainable diet is. These

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findings are echoed in a recent study highlighting the narrow focus on health and environmental indicators in research assessing the sustainability of diets.[1] They also reflect a recent survey of 27 EU counties[58] identifying that taste, food safety, and cost are prioritized above sustainability concerns and that sustainable food and diets are mostly associated with health and nutrition. It is now pertinent that broad and sustained efforts are pursued to introduce and account for the additional dimensions of sustainable diets. Although environmental concerns may not motivate most consumers, there is evidence that additional sustainability concerns, such as fair revenue for producers, workers rights, animal welfare, and the use of pesticides, are, indeed, important to consumers.[58] This offers an entry point for awareness campaigns to highlight the relationship between these concerns and environmental concerns.

Several studies suggest using health, as opposed to environmental, considerations to promote and encourage more sustainable diets.[13,27,37] However, considering the generally low level of knowledge about the wider impacts of diets, focusing on the multidimensional definition of sustainable diets and building consumer knowledge and perceived consumer effectiveness based on this definition may be a more resilient approach. Focusing on the multidimensional nature may also protect against a sustainable diet being conceptualized by stakeholders as a binary concept and as oppositional to a healthy diet. This approach requires outlining the relationship between food and the wider physical and social environment in all efforts, from awareness raising to policy development, aimed at promoting more sustainable consumption. Given the primacy afforded to health in consumers' understanding of the concept of a sustainable diet, public health and nutrition professionals have a central role to play here, beginning with the recognition that human health depends on ecological health and correspondingly assuming an ecological public health approach[70] to encouraging sustainable diets.[71]

Recognizing cultural and social acceptability as fluid concepts shaped by food environments

Much of the literature about dietary change conforms with the idea that diets more conducive to sustainable diets must be socially and culturally acceptable. Yet, food cultures have been radically altered over the past 50 years, and many of these changes can be attributed to significant modifications of physical food environments, technological advancements, agricultural subsidies favoring the production of specific crops and animals, and correspondingly, the increased availability of meat products and highly processed food, along with exceptional marketing efforts.[8,77,78] Thus, recalibrating diets from a consumer perspective will require similar sustained and substantial efforts by industry and policymakers alike, along with consumer support for the necessary dietary changes. Accessibility is a central consideration in the transition toward more sustainable diets, and although price is still critical, several additional factors influence consumption behavior. So, although ensuring more-sustainable food choices are affordable and available is a prerequisite for encouraging more-sustainable diets for all, additional choice architecture to make the more sustainable choice the more accessible and desirable choice will also be necessary.[72] Based on the literature explored in this review, this will require altering sociocultural norms and narratives, encouraging more positive attitudes toward sustainable dietary practices, along with addressing critical knowledge and awareness gaps.

Developing consistent, clear, and evidence-based messages and improving perceived consumer effectiveness

In high-income countries, eating less animal-based foods and more whole, plant-based food is the most beneficial action that can be adopted at the individual level to move toward a more sustainable diet.[4,5,74–77] However, reducing meat consumption seems to be the least popular dietary change, with most consumers favoring nonconsumption-related actions such as reducing food waste. In line with recent evidence,[78] this review highlights that people have difficulty in assessing the wider costs and benefits of their dietary choices. This presents an opportunity for the development of clear, accurate, and consistent messaging in response to knowledge gaps that may also lessen consumer confusion and skepticism.

Addressing the overconsumption of animal-sourced food and UPFs ought to be a policy priority in high-income countries, and there is a risk of the current polarization of pro- and anti-meat reduction leading to policy inertia.[79] The literature we explored suggests that this polarization and discursive power are also contributing to consumer confusion and skepticism. Consumers' belief that individual actions play a minimal role in the global context of climate change, together with lower levels of concern for environmental matters more generally, tend to inhibit the shift toward more sustainable diets.[25,27,38,46] Policy-makers can begin to address these challenges by (1) communicating the urgency of climate change and its relationship with food production and consumption in a transparent and evidence-based manner,[78] (2) protecting against

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conflicts of interests in policy-making,[9,73,80,81] and (3) minimizing conflicting narratives.[79]

Developing and promoting holistic, sustainable, food-based dietary guidelines that provide clear guidance on protein needs and sources and ultra-processed foods

Several studies reviewed here recommend incorporating sustainability in food-based dietary guidelines (FBDGs).[19,20,25,30,31] Despite weak adherence to FBDGs across most countries, which likely is compounded by socioeconomic factors,[6] they are of critical importance in setting standards for various food policies, from food reformulation to public food procurement,[82–84] and thereby contributing to shaping food cultures. Historically, the focus of dietary recommendations has been centered on nutrients rather than dietary patterns,[5] whereas today, a growing number of studies (see Kumanyika et al[75] for a full review) are using a dietary-pattern approach that better reflects how food is consumed and the relationship between diets, health, and environment. Within these patterns, 2 dietary considerations remain steadfast: protein source and the degree of processing.

A reduction in protein intake is not recommended for vulnerable groups, in particular older adults and those at risk of sarcopenia.[86] However, for most of the world's consumers living in high-income countries, and excluding vulnerable groups such as the young or elderly, protein intake exceeds the daily recommended amount.[87] Nonetheless, a continued reductionist focus on protein as a macronutrient of concern has been a very successful marketing strategy, and today, all major meat and dairy corporations are investing heavily in plant-based protein foods.[87,88] Encouraging meat alternatives is 1 strategy highlighted in the literature focused on the general population that can be pursued to align diets with sustainability concerns, yet some caution is required in the context of ultra-processed alternatives. These products tend to be marketed as a more sustainable choice yet carry similar health, social, environmental, and food-culture concerns as other UPFs.[80,89,90] These foods are also central to the issue of power concentration and the politics of food, which tend to be the lesser-explored elements in discussion of sustainable diets centered on consumers.[91]

Considering that UPFs already form a substantial proportion of the contents of consumers' shopping baskets,[7] along with the expected growth in this sector over the coming years,[87] offering clear guidance on all UPFs is 1 approach that will be beneficial for future FBDG.[92–94] However, this would require FBDGs to communicate what UPFs are and provide information about the levels of processing more generally to avoid consumer confusion.[93] As Cotter et al[94] suggest, "Much as marketers build a brand, the public health community needs to build meaning around the term 'ultra-processed.'" The same recommendation could also be applied in relation to the term *sustainable diets*.

Currently, consumers approach sustainable diets from a human health perspective primarily, and the interconnectedness of human health and well-being with environmental health is poorly understood. This highlights the need for public health professionals to work with other sectors and disciplines to develop clear, simple, and coherent messages and narratives. However, several tensions and considerations necessitate exploration in both the country context and the international context, given the highly globalized nature of the contemporary food system. For example, in dietary guidelines, terms such as local foods, processed food, and seafood as general food categories will require further nuance and more accurate representation, in terms of what a sustainable diet is, that considers additional impacts beyond greenhouse-gas emissions and nutritional benefits. Moreover, although reducing the overconsumption of meat is central to the transition toward more sustainable diets, the human and planetary health risks and impacts associated with meat consumption depend on how that meat was raised, processed, and prepared.[88,95] Researchers, policy-makers, and the wider public-health nutrition community must begin to account for the complexities in food systems and consider the multidimensional nature of sustainability before developing sustainability messages encouraging more sustainable diets. Using a multicriteria framework[96] as a starting point to map the effects, influences, and various trade-offs would be a useful first step in this regard.

The majority (69%) of the studies included in this review used quantitative methods. This highlights the need for further qualitative research exploring consumer behaviors and attitudes toward more sustainable diets, in addition to research that considers the sociopolitical and structural factors influencing consumer behavior and attitudes. This would provide a more rounded perspective on the barriers and enablers in the transition toward more sustainable diets. Additionally, well-educated, urban, and female populations tend to be overrepresented in the research focused on consumer behaviors and attitudes toward more sustainable diets. Researchers should endeavor to capture a broader representation of populations to ensure the views and specific challenges faced by those with, for example, access to fewer resources, are accurately captured. Finally, reducing meat consumption in high-income countries is central to encouraging more-sustainable

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diets and food systems, and this was reflected in the number of studies focused on this topic. However, the growing evidence base concerning the wide-ranging effects of UPFs places these foods as an essential consideration for research exploring consumer behaviors and attitudes toward more sustainable diets.

Several studies included in this review suggest that indirect and structural approaches may be better to facilitate the mainstreaming of more plant-based diets,[53,54,64] and this is aligned with several other global studies highlighting the critical role of government policy in enabling more sustainable diets.[9,97] Learning from action related to other health challenges (eg, the global obesity pandemic) illustrates that although targeting the behaviors of individuals may be an easier approach politically, it requires a high degree of individual agency and is limited in its population effects.[98] It is now widely accepted that increased action at the policy-intervention level is critical. Similarly, we highlight here that a range of intermediary factors influence the uptake of more-sustainable diets and how individual agency is limited by the sociocultural, economic, and political contexts in which people live. Thus, increasing the focus on these structural and intermediary determinants influencing diets in both policy and research (Tables 1–3) will be essential to supporting the necessary population-wide transition toward more-sustainable diets.

CONCLUSION

Facilitating dietary change is a critical component of the transition toward more-sustainable diets. We provide an overview of the range of challenges that must be addressed in promoting the uptake of more-sustainable dietary practices and present several interventions that can pursued to facilitate more sustainable diets. The findings contribute to improved understanding of how support can be generated for the necessary structural and system-level changes that are required to support behavior change. Ultimately, we assert in this review that consumers, insofar as they are interested in sustainability and have the capacity to engage with the concept, approach it from a human health perspective primarily, and that the interconnectedness of human health and well-being with environmental health is poorly understood and under-researched in the context of consumer behaviors and attitudes toward more sustainable diets. Considering the centrality of human health in current consumer conceptualizations of the term *sustainable diet*, and in dietary motivations, public health professionals are central to promoting a more holistic understanding of the term. Correspondingly, 3 key actions to facilitate progress toward more sustainable diets are recommended. First, sustained efforts are needed from public health professionals to encourage a realignment of the term *sustainable diet* with its multidimensional meaning by championing an ecological public health approach in all efforts aimed at promoting more sustainable consumption from awareness raising to policy development. Second, a broader research lens should be focused on the multidimensional concept of sustainability in the literature exploring consumer attitudes and behaviors. And third, the development of multidisciplinary, clear, and evidence-based sustainable eating messages, including holistic sustainable dietary guidance, is needed to address knowledge gaps, minimize conflicting narratives, and build consumer agency. Although more research that accounts for country-specific sociocultural, and economic considerations will be essential to developing these messages and strategies for supporting more sustainable diets, the existing literature highlights several considerations and specific actions targeting various challenges (Tables 1–3) that can be pursued in the meantime to encourage and support more sustainable diets.

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Supporting Information

The following Supporting Information is available through the online version of this article at the publisher's website.

Table S1 **Articles included and separated by focus areas**

Table S2 **Determinants influencing more (+) or less (–) sustainable diets**

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