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Review

Improving Communication of the UK Sustainable Healthy Dietary Guidelines the Eatwell Guide: A Rapid Review

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Abstract: Background: Food-based dietary guidelines (FBDG) are a key public health tool, providing evidence-based recommendations for a healthy and more environmentally sustainable diet. Current adherence to national FBDG in the UK is poor with only 0.1% of the population meeting all of the recommendations set out in the Eatwell Guide. Communication of the Eatwell Guide is one of the many essential strategies needed to improve adherence and to support the necessary shift towards sustainable diets in the UK. An effective strategy is needed to communicate this information to policy makers, the food industry, health professionals and the public in order to drive dietary behaviour change. **Methods:** The authors conducted a rapid review of the scientific literature available in the SCOPUS database published between 2012 and 2022 (inclusive). Keywords searched related to the communication and implementation of FBDG. Additionally, examples of communication strategies for national FBDG globally are presented to demonstrate examples of good practice in this field. **Results:** The review highlighted several key themes relating to effective communication of FBDG. As a result, five recommendations are made for how communication of the Eatwell Guide could be improved to drive better adherence to these sustainable healthy guidelines. The recommendations are (1) review of language and tone of nutrition and sustainability related messages; (2) targeting of FBDG and communications to specific population segments; (3) addressing barriers to and benefits of adopting the Eatwell Guide recommendations; (4) development of practical tools and resources to support implementation of the guidelines; and (5) leveraging social media and social marketing techniques to increase public engagement. **Conclusions:** This research summarises the current scientific literature on the effective communication of FBDG. The recommendations may be used to improve future communication strategies for the Eatwell Guide as well as other national and international sustainable healthy FBDG.

Keywords: dietary guidelines; nutrition communication; sustainable diets; public health nutrition

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1. Introduction

Food-based dietary guidelines (FBDG) are a key public health tool, providing evidence-based recommendations for a healthy diet [1]. They are designed to communicate information to a range of stakeholders including policy makers, the food industry, health professionals and the public as well as to inform nutrition policies and public health campaigns [1,2].

FBDG are currently developed by government bodies and authoritative organisations primarily based on current evidence for diet-related health outcomes [1]. However, our food choices and agricultural practices also contribute to environmental concerns such as climate change, biodiversity loss, soil degradation, water shortages and pollution [3]. These environmental changes also impact the food system, with the potential to limit our ability to produce adequate nutritious food in the future [3,4].

The Food and Agriculture Organisation (FAO) and the World Health Organisation (WHO) define sustainable healthy diets as "dietary patterns that promote all dimensions of individuals' health and wellbeing; have low environmental pressure and impact; are accessible, affordable, safe and equitable; and are culturally acceptable" [5]. Healthy dietary patterns are not necessarily sustainable in the long term [1]. It is therefore argued that FBDG should represent dietary patterns and behaviours which are not only nutritionally adequate but also sustainable [3,4].

National FBDG are available for almost 100 countries globally and are available and regularly updated on FAO website [6]. Extensive reviews and comparison of the visual style and content of FBDG have been carried out previously [7–9]. The majority of national FBDG have at the core a visual representation of a healthy diet showing variety and proportion of several key food groups necessary for good health. Many FBDG also make recommendations for physical activity and water consumption.

Sustainability is not explicitly mentioned in the majority of national FBDG. Despite this, diets recommended by FBDG which include a higher proportion of plant-based foods, such as vegetables, fruits, wholegrains, legumes, nuts and seeds, have a lower carbon and land footprint [10–13]. The extent to which 85 national FBDG meet health and environmental targets has been analysed by Springmann et al. [14]. The researchers highlight that, in many cases, widespread adoption of national FBDG may not be adequate to meet global health and environmental targets, although they are an improvement compared to current average diets and therefore a step in the right direction.

Two systematic reviews conclude that diets which exclude meat typically have a lower environmental impact, based on carbon footprint and land use, than healthy, balanced omnivorous diets, although not necessarily in terms of water use [11,15]. However, it is important for FBDG to consider social and cultural acceptability of the foods and dietary patterns recommended [1]. Flexitarian diets, such as those aligned with national FBDG, are therefore a realistic compromise for sustainable diets to improve health outcomes and reduce environmental impact [16,17].

1.1. FBDG in the United Kingdom

The UK FBDG developed by Public Health England (PHE) are represented by the Eatwell Guide, a visual plate model depicting the recommended proportion by volume of five key food groups in a balanced diet, determined via linear programming: starchy carbohydrate foods (37%); fruit and vegetables (39%); dairy and alternatives (8%); beans, pulses, fish, eggs, meat and other protein foods (12%); and oils and spreads (1%) [18,19].

Processed high fat, salt and sugar (HFSS) foods are placed outside of the main plate to highlight that they should be consumed only occasionally and in small amounts, representing the remaining 3% [20]. Additional nutrition messages which form part of the Eatwell Guide relate to hydration, recommended energy intake for adults and how to choose healthier packaged foods using the front-of-pack traffic-light food labelling system [19].

The supporting information booklet includes recommended servings for some food groups: a minimum of five servings of fruit and vegetables daily; a maximum of 70 g red and processed meat per day; and two servings of fish weekly, one of which should be oily [21]. Recommended portion sizes for other food groups are not specified and it is suggested that additional tailoring of the dietary recommendations to individual needs should be carried out by a nutrition professional [22].

The UK FBDG also include government dietary recommendations for specific nutrient intakes such as energy, fibre, sugar, salt, saturated fat and various vitamins and minerals for defined gender and age groups, available as a downloadable pdf document [23].

1.2. Environmental and Health Impacts of FBDG Adoption

These guidelines have been designed to improve health and reduce rates of non-communicable disease in the UK. According to the Burden of Disease study data for the UK, dietary factors are the cause of 34% of deaths from cardiovascular disease (UK's and

global leading cause of mortality) and 18.5% from diabetes [24]. The percentage of adults and children who are overweight and obese also continues to rise [25], with the cost to the National Health Service (NHS) of related ill health estimated at £6.1 billion [26].

It is estimated that widespread adoption of diets aligned with FBDG would increase life expectancy in the UK by 5–8 months, primarily due to a decrease in risk factors for non-communicable diseases [27–29]. In the UK Biobank cohort, higher adherence to the WHO dietary guidelines, which are approximately aligned with the Eatwell Guide, is associated with a lower mortality risk, as well as lower body fat, waist circumference and low-density lipoprotein (LDL) cholesterol [30].

In addition to public health improvement, the UK has also committed to reduce its environmental impact, including a reduction in national greenhouse gas emissions (GHGe) by 68% by 2030, compared to 1990 levels [31]. The climate research organisation Climate Action Tracker has highlighted neglecting dietary change in current climate policy, along with other elements such as energy efficiency, as a critical delivery risk for this target [32]. Although environmental sustainability was not explicitly considered when deriving the Eatwell Guide FBDG [1], increased adherence to the Eatwell Guide amongst the UK population is associated with both health and environmental benefits.

It is estimated that a widespread shift from the current average UK dietary intake to align with WHO dietary guidelines, would result in a 17% decrease in dietary GHGe emissions [27]. Aligning average dietary intakes in high-income nations to healthy FBDG would reduce GHGe, land use and water use associated with food production by 12%, 19% and 6%, respectively, with additional reductions possible with further optimisation [11]. For example, when dietary energy intake is also adjusted to meet global guidelines, GHGe may be reduced by as much as 25% in high-income nations where excessive energy intake is a concern [13].

Individuals with a moderate to high adherence to the Eatwell Guide recommendations have a 30% lower dietary carbon footprint and a 7% reduced total mortality risk, compared with those with very low adherence [33]. A report commissioned by the Carbon Trust concluded that widespread adoption of the Eatwell Guide would significantly reduce the carbon footprint as well as agricultural land and freshwater use, compared to the current UK diet [34]. They also highlight the importance of agricultural production efficiency and reducing food waste, although these factors were not included in their analysis.

The One Blue Dot project, commissioned by the British Dietetic Association, goes further in presenting environmentally sustainable dietary guidelines for the UK population [35]. In addition to reducing meat consumption, particularly red and processed meat, they also suggest other dietary behaviours to further reduce the dietary environmental footprint, although these recommendations have not been incorporated into the Eatwell Guide which is the focus of the present study. These behaviours, aligned with current research on sustainable diets, include choosing sustainable fish, buying local and seasonal produce and reducing food waste which are in line with the current research on sustainable diets.

It is outside the scope of this study to assess the adequacy of the Eatwell Guide to meet environmental targets. However, the communication strategies highlighted in this review may also be applied to other sustainable FBDG and any future revisions of the Eatwell Guide.

1.3. Adherence to the Eatwell Guide

Despite the environmental and health benefits of adopting diets aligned with FBDG, a systematic review of 19 countries with national FBDG concluded that approximately 40% do not follow their nutrition recommendations [36]. In the UK specifically, adherence to the Eatwell Guide recommendations is very low with only 0.1% adhering to all nine recommendations, 30% of the UK population adhering to five or more and 23% adhering to two or less [33].

More than half of the UK population do not consume adequate fibre or oily fish and exceed the maximum healthy intake of sugar and saturated fat [33,37,38]. Only 28% of

adults consume the recommended five portions of fruit and vegetables per day and this figure is lower for men, children and young adults aged between 16 and 24 years [39]. A higher proportion of women exceed recommendations for sugar and saturated fat intake whereas fewer men meet the recommended intake of total carbohydrate, poly-unsaturated fat and protein [40].

There is evidence that average UK diets are moving towards some of the recommendations set out in the Eatwell Guide. According to National Diet and Nutrition Survey (NDNS) data for the years 2016–2019, average per capita total meat and red meat consumption decreased by 16.8% and 36.6%, respectively, between 2008 and 2019. However, average intakes of sugar, saturated fat and fibre are still not aligned with government recommendations [41].

Improving adherence to national FBDG is therefore a necessary step to reaching public health, environmental and economic targets in the UK as well as other high-income countries [17].

1.4. Improving Adherence to FBDG via Effective Communication

It is widely acknowledged that consumers' food choices are impacted by many factors which can be individual, social, environmental and economic [42]. Although behaviour change is complex and is significantly influenced by wider factors, nutrition information and communication shapes consumers' knowledge, attitudes and skill set which play an integral role in changing dietary behaviours [43].

Nutrition communication has been defined as "the process by which nutrition knowledge is converted into dietary change" [44]. It is the role of nutrition communication to present credible and practical nutrition information and to promote healthy dietary behaviours [45]. The same applies to promotion of sustainable diets. Effective communication of national FBDG is important to empower consumers with the knowledge and skills they need to make better dietary choices, although it needs to be combined with other elements, such as changes to the food environment, as part of a broader strategy [46].

An effective FBDG communication strategy should ensure knowledge and understanding of the key elements of the recommended diet as well as skills to select and prepare meals in alignment with the guidelines [46]. Although consumers in high-income countries have some awareness of FBDG, they appear to lack specific knowledge and practical understanding, highlighting some areas for improvement in communication [47]. For this reason, improved communication of the Eatwell Guide is an important element of driving adherence to these sustainable healthy FBDG in the UK.

Current Eatwell Guide communications consist of a downloadable visual of the plate model, a quick guide to the recommendations and a booklet providing further information on each of the food groups [48]. Further written information to support adherence to the FBDG is provided via the NHS website, including tips for healthy eating; information on processed foods; guidance on reading nutrition labels; and advice on how to reduce dietary sugar, saturated fat and salt [48].

Additionally, practical resources aligned with the Eatwell Guide, aimed at families with children, are provided via the NHS Better Health: Healthier Families (previously Change4Life) campaign website [49]. These include nutrition advice; healthy recipes and snack ideas; tips to reduce dietary sugar, fat and salt; a calculator for determining the amount of sugar in children's daily diet; and a supermarket food scanner app which offers healthier swap suggestions for commonly purchased food products. Currently, none of these resources refer explicitly to sustainability or the environmental impact of our dietary choices.

Systematic reviews have compared the content and visual elements of FBDG globally [7,8]. However, to our knowledge, there has so far been no review of dietary guideline communication strategies. In this study, we reviewed the available research on the communication of FBDG. The aim of the study was to identify evidence-based strategies for

communicating FBDG and to provide a summary of this research to UK-based decision makers in order to guide more effective communication of the UK Eatwell Guide.

2. Materials and Methods

A rapid review methodology was employed for this study. This is similar to a systematic review but with modifications to the literature review strategy to reduce the timeframe of the study. To increase quality, we used the flexible framework for rapid reviews suggested by Plüddeman et al. (2018) [50]. Rapid reviews have emerged as a useful tool to communicate research to decision makers in a period of one to six months [51]. This type of research is being increasingly used by policy makers to inform guidelines in urgent and emerging health topics [52]. Due to the urgent need for shifts towards sustainable healthy diets in the UK and globally, we deemed a rapid review most appropriate for this study. The review protocol, including the search strategy employed, is published on the Center for Open Science [53].

2.1. Search Strategy

The electronic database SCOPUS was searched in July 2022 for publications containing the identified keywords. The keyword strategy was designed to align with the project aims and refined through a series of iterative searches. The database search was limited to publications from 2012 onwards and in the English language.

2.2. Study Eligibility Criteria

The study included publications relating to communication and implementation of dietary guidelines. Publications focused on the development of the dietary guidelines themselves were excluded as this was outside the scope of this review. Studies which focused on dietary regimens for specific health conditions, rather than population-wide dietary advice, and studies carried out in developing countries or indigenous populations were also excluded. Various study types including cross-sectional, cohort and interventions (randomised and non-randomised trials) were included along with systematic and other reviews. No restrictions were placed on the duration or location of the study.

2.3. Data Collection and Analysis

Publication titles obtained from the database search were reviewed by the first author (AC). The titles and abstracts of publications deemed in scope were then reviewed by the first author to produce the final list of publications. In some cases, it was necessary to review the full paper to determine whether the content was in scope. Several additional sources, retrieved from the reference lists of eligible papers, were included in the rapid review if they met the initial inclusion criteria (see Table 1 for indexing of supplementary references).

Table 1. Characteristics and location of sources used in the rapid review.

Ref	Study	Location	Study Type	Topic	Design	Themes
[54]	Mills et al., 2013	Australia	Quantitative	Health/nutrition messages	Cross-sectional study, quantitative telephone survey (n = 1997, age 16–69 years) evaluating the effectiveness of arts sponsorship to promote health messages	Communication channels
[55]	Brownie and Coutts, 2014	Australia	Qualitative	FBDG	Qualitative consumer focus groups (n = 29, aged 60–98 years) exploring older people's awareness of current age-adjusted FBDG	Targeting and personalisation, practical tools and resources, communication channels
[56]	Pollard et al., 2016	Australia	Qualitative	Health/nutrition messages	Qualitative focus group study of SMS nutrition messages aimed at health behaviour change in young adults (n = 39, aged If it is hard to revise the sequence of the reference citations, we will help you to do this process. 18–30 years)	Communication channels, language and tone, targeting and personalisation

Table 1. *Cont.*

Ref	Study	Location	Study Type	Topic	Design	Themes
[57]	Pettigrew et al., 2017	Australia	Mixed methods	Specific foods/food groups	Cross-sectional study, mixed methods online survey of perceptions of terms used to describe unhealthy foods (n = 409, 63% female, aged 25–64 years)	Language and tone, visual representation and food groups
[58]	Rooney et al., 2017	Australia	Qualitative	Specific foods/food groups	Qualitative semi-structured consumer interviews (n = 28, aged 19–55 years) exploring understanding of fruit and vegetable intake guidelines amongst low consumers	Practical tools and resources
[59]	Klassen et al., 2018 (from Jenkins et al., 2020)	Australia	Quantitative	Media and advertising	Content analysis study, quantitatively assessing the engagement with various health messages communicated by popular social media accounts	Communication channel, language and tone
[60]	Figueira et al., 2019	Australia	Mixed methods	Specific foods/food groups	Online survey of consumer understanding and use of legume recommendations (n = 308, 78% female, 22% male, mean age 39 years)	Visual representation and food groups, addressing barriers and benefits, communication channels
[61]	Jenkins et al., 2020	Australia	Quantitative	Media and advertising	Cross-sectional study, quantitative survey of students' perceptions of social media posts (n = 149, 54% female, median age 20 years)	Communication channels, addressing barriers and benefits
[62]	Barklamb et al., 2020 (from Jenkins et al., 2020)	Australia	Quantitative	Media and advertising	Content analysis study, quantitatively assessing the engagement with various health messages communication by popular social media accounts	Communication channels, language and tone
[63]	Bramston et al., 2020	Australia	Qualitative	Health/nutrition messages	Qualitative study (focus groups and questionnaires) (n = 34, 74% female, aged 18–15 years) analysing perceptions of 15 education videos	Communication channels, practical tools and resources
[64]	Molenaar et al., 2020 (from Jenkins et al., 2020)	Australia	Qualitative	Health/nutrition messages	Qualitative study (n = 166, aged 18–24 years) exploring values and perceptions related to health, healthy behaviours and health promotion efforts	Targeting and personalisation, addressing barriers and benefits
[65]	Reyneke et al., 2022	Australia	Mixed methods	FBDG	Cross-sectional study, online mixed methods survey (n = 275, 84% female, 70% aged 45+ years) assessing Australian adults' understanding of whole grain and legume recommendations within FBDG	Visual representation and food groups, practical tools and resources
[66]	Rogers et al., 2022	Australia	Scoping review	Health/nutrition messages	Scoping review of nutrition communications by influencers on social media. A total of 11 studies identified from a search of 9 databases between 2016 and 2021	Language and tone, communications channel
[67]	Missbach et al., 2015	Austria	Quantitative	Media and advertising	Cross-sectional study of the quality and frequency of 1919 food-related video advertisements targeted at children published in February and March 2014	Communication channels
[68]	De Bauw et al., 2021	Belgium	Quantitative	Dietary behaviour	RCT assessing impact of nutrition and eco-labels on adult consumers' food purchasing behaviours (n = 805, 47% female)	Communication channels
[69]	Khandpur et al., 2020	Brazil	Mixed methods	FBDG	Mixed methods study of message development and refinement to support FBDG for the Brazilian population	Language and tone, multi-level approach, visual representation, address barriers and benefits
[70]	Scaciota et al., 2022	Brazil	Methodological study	FBDG	Methodological study—development and content validity of educational material relating to FBDG	Communication channels, visual representation and food groups, multi-level approach, address barriers and benefits
[71]	Fernandez et al., 2020	Canada	Review	FBDG	Review relating to revised protein guidance within Canadian FBDG	Visual representation and food groups, targeting and personalisation, practical tools and resources
[72]	Nørnberg et al., 2014	Denmark	Quantitative	Dietary behaviour	Quantitative study amongst university students (n = 58, 41% female, ages 20–29 years) assessing the accuracy of self-estimated portion sizes at a fake food buffet	Practical tools and resources
[73]	Reckinger and Régnier, 2017	France and Luxem-bourg	Mixed methods	FBDG	Mixed methods—qualitative analysis of nutritional recommendations and individual interviews with representative sample of working adults from mixed geographical and economic backgrounds (n = 166)	Language and tone, communication channels
[74]	Teschl et al., 2018	Germany	Quantitative	Specific foods/food groups	Cross-sectional study of students' knowledge of vegetable recommendations within FBDG and assessment of current vegetable intake (n = 365, 69% female)	Practical tools and resources

Table 1. *Cont.*

Ref	Study	Location	Study Type	Topic	Design	Themes
[75]	Lee et al., 2020	Malaysia	Review	FBDG	Review of FBDGs in relation to obesity prevention	Targeting and personalisation, language and tone, multi-level approach
[76]	Boylan et al., 2012	Multiple	Systematic review	Health/nutrition messages	Systematic review of consumer responses to lifestyle recommendations in 46 publications	Language and tone, practical tools and resources, targeting and personalisation, visual representation and food groups
[77]	Green, 2015	Multiple	Review	Development/ implementation/ evaluation of FBDG	Review of FBDGs vs. nutrient guidelines	Communication channels, practical tools and resources, language and tone
[78]	Nikolaus et al., 2016 (from Jung et al., 2019)	Multiple	Systematic review	Dietary behaviour	Systematic review of studies published between 1984 and 2015 assessing impact of grocery store tours on nutrition knowledge and behaviours	Communication channels
[79]	Pettigrew et al., 2016	Multiple	Review	Media and advertising	Review of food of pleasure concept in healthy eating focused social marketing campaigns	Address barriers and benefits
[80]	Geraldi et al., 2017	Multiple	Scoping review	Development/ implementation/ evaluation of FBDG	Description of pictorial representation of FBDGs	Visual representation and food groups
[81]	Truman, 2018	Multiple	Qualitative	Development/ implementation/ evaluation of FBDG	Qualitative analysis of 74 plate-based FBDGs	Visual representation and food groups
[82]	Klassen et al., 2018	Multiple	Systematic review	Media and advertising	Mixed methods systematic review of social media use for nutrition-related outcomes (n = 23)	Communication channels
[83]	Van Der Horst et al., 2019	Multiple	Scoping review	Dietary behaviour	Scoping review of consumer understanding of serving size	Communication channels, practical tools and resources
[84]	Tetens et al., 2020	Multiple	Workshop outcome report	Development/ implementation/ evaluation of FBDG	Report from workshop of expert group on FBDG communication and content	Visual representation and food groups, practical tools and resources, communication channels, language and tone
[85]	Quinn et al., 2021	Multiple	Review	Specific foods/food groups	Review of ultra-processed foods in FBDGs	Visual representation and food groups
[86]	Godinho et al., 2016 (from Vidal et al., 2019)	Portugal	Quantitative	Health/nutrition messages	Longitudinal study of university students aged 18–48 years (n = 180, 84% female) assessing impact of gain vs. loss-framed messages to promote fruit and vegetable consumption	Language and tone
[87]	Bergman et al., 2018	Sweden	Stakeholder opinion	Development/ implementation/ evaluation of FBDG	Stakeholder opinions from public consultation on updated Swedish dietary guidelines	Language and tone, targeting and personalisation
[47]	Mötteli et al., 2016	Switzerland	Quantitative	Dietary behaviour	Quantitative experimental study (n = 187, 51·9 % female, aged 18–65 years) investigating food choice behaviour at a fake food buffet	Practical tools and resources
[88]	Verain et al., 2017	Switzerland	Quantitative	Development/ implementation/ evaluation of FBDG	Cross-sectional study determining impact of segmentation of FBDG communications based on consumer motivations (n = 829, 54% female, mean age 50 years)	Targeting and personalisation, addressing barriers and benefits
[89]	Faulkner et al., 2012	UK	Review	Dietary behaviour	Review of serving size guidance published in the UK	Practical tools and resources
[90]	Lewis et al., 2012	UK	Review	Health/nutrition messages	Cross-sectional study of 7 public portion size guidance schemes in 2010	Practical tools and resources
[91]	Tanner et al., 2012	UK	Content analysis	Media and advertising	Content analysis of 11,830 beverage-related media messages on national television news between 2002 and 2008	Communication channels
[92]	Kininmonth et al., 2017	UK	Quality assessment	Media and advertising	Cross-sectional study of the quality of 114 nutrition-related newspaper articles published in national newspapers during a 6-week period in 2014	Communication channels
[93]	Embling et al., 2020	UK	Mixed methods	Health/nutrition messages	Online mixed methods survey (n = 240, aged 18+ years) assessing consumer perceptions of dietary variety	Visual representation and food groups
[94]	Vidal et al., 2019	Uruguay	Quantitative	Health/nutrition messages	Quantitative study (n = 1997, aged 16–69 years) evaluating the effect of message framing on diet-related intentions and behaviours	Language and tone, communication channels
[95]	Levine et al., 2012	USA	Evaluation-framework	Development/ implementation/ evaluation of FBDG	Evaluation framework design for USA MyPlate communications strategy	Multi-level approach
[96]	Quagliani and Hermann, 2012	USA	Practice paper	Health/nutrition messages	Practice paper of the Academy of Nutrition and Dietetics	Communication channels, language and tone
[97]	Nicklas et al., 2013 (from Chea and Mobley, 2020)	USA	Mixed methods	Development/ implementation/ evaluation of FBDG	Nominal Group Technique (combination of qualitative and quantitative focus groups) analysing barriers and facilitators to adopting US FBDG	Addressing barriers and benefits

Table 1. *Cont.*

Ref	Study	Location	Study Type	Topic	Design	Themes
[98]	Kapsak et al., 2013	USA	Quantitative	Development/ implementation/ evaluation of FBDG	Quantitative evaluation of FBDG messages in terms of believability, motivation and likelihood to change behaviour	Language and tone, targeting and personalisation
[99]	Freeland-Graves and Nitzke, 2013	USA	Position paper	Development/ implementation/ evaluation of FBDG	Position paper from Academy of Nutrition and Dietetics on total diet approach	Language and tone, communication channels
[100]	Nagler, 2014 (from Lee et al., 2018; Fernandez et al., 2020)	USA	Quantitative	Media and advertising	Cross-sectional study of exposure to contradictory nutrition messages in the media (n = 631, 56% female, mean age 51 years)	Communication channels
[101]	Pomeranz and Miller, 2015	USA	Review	Dietary behaviour	Review of policies relating to children's serving sizes	Practical tools and resources, multi-level approach
[102]	John et al., 2017	USA	Quantitative	Specific foods/food groups	Cross-sectional study assessing the impact of a 5-week state-wide social media intervention promoting low-fat milk	Language and tone, communication channels
[103]	Lee et al., 2018	USA	Quantitative	Media and advertising	Longitudinal study, online quantitative survey of a nationally representative sample of adults assessing exposure to and impact of conflictual media messages (n = 571, 52% female)	Communication channels
[104]	Rahavi and Bevington, 2018 (from Khandpur et al., 2020)	USA	Practice paper	Health/nutrition messages	Tools for effective nutrition communication aimed at health professionals	Language and tone, targeting and personalisation
[105]	Chrisman and Diaz Rios, 2019	USA	Review	Development/ implementation/ evaluation of FBDG	Review of representation of MyPlate in nutrition education literature	Visual representation and food group, communication channels, multi-level approach
[106]	Jung et al., 2019	USA	Quantitative	Dietary behaviour	Cross-sectional study (n = 147, 73% female, 57% Caucasian) of impact of educational supermarket tour on intention to purchase fruit and vegetables	Communication channels
[107]	Chea and Mobley, 2020	USA	Mixed methods	Development/ implementation/ evaluation of FBDG	Cross-sectional study, mixed methods study of interpretation, understanding and implementation of FBDG amongst low-income adults with children aged 3–10 years (n = 98, 97% female, mean age 35.5 ± 9.4 years)	Visual representation and food groups, addressing barriers and benefits, multi-level approach
[108]	Kronrod et al., 2021	USA	Quantitative	Dietary behaviour	Quantitative study assessing the impact of dish names on purchase frequency in a university canteen over a 4-month study	Language and tone, address barriers and benefits
[109]	Sanders et al., 2021	USA	Expert group	Development/ implementation/ evaluation of FBDG	Report from workshop of expert group on implementing Dietary Guidelines for Americans	Practical tools and resources, communication channels, targeting and personalisation
[110]	Macias and English, 2022	USA	Quantitative	Development/ implementation/ evaluation of FBDG	Cross-sectional study, online quantitative survey (n = 632, aged 18–68 years) measuring knowledge and factors influencing adoption of FBDG	Communication channels
[111]	Zhou et al., 2022	USA	Mixed methods	Media and advertising	Content analysis of 85 culturally tailored sugary-beverage advertisements followed by a mixed methods survey amongst Afro-Caribbean, Hispanic and Latino populations (n = 76, 72% female)	Targeting and personalisation

2.4. Data Extraction and Management

The full text of all relevant publications was reviewed by AC. Data about the type of study and location were extracted as well as the findings which were entered into a pre-designed data management form. A random sample of 20% of the full texts and the data extraction were verified by the second author (JB) [50]. Where available, data relating to population size and characteristics were extracted. Due to the heterogenous nature of the sources, both in the objectives and outcomes as well as the types of research (see Table 1), a meta-analysis was not possible for this study.

2.5. Synthesis and Presentation of Results

In order to present the literature synthesis in a more concise and accessible format, common themes were identified from the extracted data. During the initial review, ten themes relating to communication strategies were identified by AC which were features of

two or more publications. These were then grouped into seven over-arching themes, as presented below.

Following this, a synthesis of the literature was conducted. Firstly, a general summary of the publications and the key themes identified are presented. Secondly, the literature is synthesised in a narrative summary organised by theme, noting similarities and heterogeneity between the sources. Where possible, examples of national FBDG and public health campaigns which adopt these strategies are given, including Ireland, Australia, USA, Brazil, Canada, the Netherlands, as well as the UK [112–119].

3. Results

3.1. Literature Search and Screening

The number of publications obtained by the database keyword search at each screening stage is shown in Figure 1. A total of 59 full texts were included in the final review (see Table 1 for a summary of their characteristics). About one third (31%) of the publications were from North America, 22% from Australia, 15% from Europe, 8% from the UK, 5% from Latin America and 2% from Asia. The remaining 17% were reviews which included sources from multiple countries.

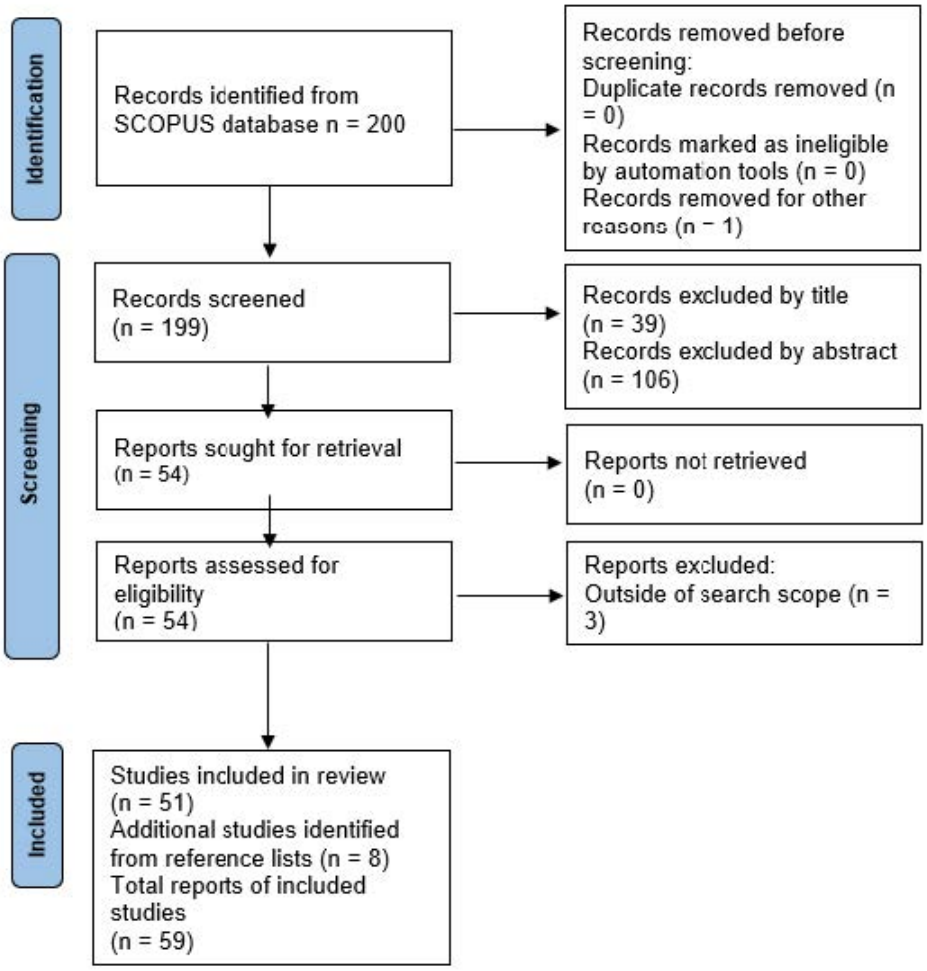

Figure 1. Study selection PRISMA flowchart. Copyright statement: Adapted from the PRISMA diagram template, distributed under the terms of the Creative Commons Attribution License. See: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews [120].

There was significant variation in the aims and outcomes of the sources included, with few sources relating specifically to the communication of sustainable dietary guidelines. Although all sources related to nutrition communication and were therefore relevant to

the aims of this review, some were focused on the development, implementation and evaluation of FBDG communication, whereas others focused on specific foods or food groups or nutrition and health messages more generally. The methods of communication analysed were also broad, including nutrition communication strategies employed for national FBDG but also those used within behavioural interventions and media advertising.

Seven key themes relating to the communication of FBDG were identified via the literature review:

Language and tone;
Targeting and personalisation;
Visual representation and food groups;
Addressing barriers and benefits;
Practical tools and resources;
Communication channels;
Multi-level approach.

A narrative summary of the research is provided for each theme, with examples of national FBDG that currently employ this strategy, where possible.

3.2. Literature Review Synthesis

3.2.1. Language and Tone

The language and tone of nutrition messages is a key consideration across FBDG communications. It is generally recommended that messages are short, simple, specific and easy to understand, based on the food and nutrition literacy of the intended audience [71,76,109]. As an example, the core messages of the Brazilian FBDG were refined to be less than three sentences long with direct, one-sided messages [69].

Additionally, it is important that the language used in FBDG communications is interpreted as intended. There is a high level of inconsistency in national FBDG with regards to how unhealthy foods are described, which impacts consumer attitudes towards these foods [57,85]. Other terms included in sustainable healthy FBDG which may not be well understood by consumers include plant-based [93], whole grains [107], legumes [65], balance [76] and dietary variety [109]. It is therefore necessary to ensure clarity and understanding of the terms used in FBDG communications.

The tone, which describes the emotional response the messages are intended to generate in the audience, has also been identified as an important element of nutrition communication. In 2013, the Academy of Nutrition and Dietetics' position on FBDG was that nutrition messages should be proactive, empowering and practical [99]. Australian researchers have observed that young adults, particularly females, perceive empathetic language as significantly more persuasive compared to authoritative messages [56]. In a review of social media influencers' communications, Rogers et al. identified the use of positive, humorous, motivational, inspirational, accusatory and heroic tones of nutrition messages as well as language techniques such as exaggeration and rhetorical questions [66].

Another question which has been raised, in the context of both behavioural recommendations and on-pack nutritional information, is whether messages should be gain-framed (i.e., promoting benefits) or loss-framed (i.e., highlighting the risks). Consumers report a preference for gain-framed messages, perceiving them as more credible as well as reporting a higher intention to follow the recommendations [94]. However, there is limited evidence that the framing of messages impacts their effectiveness at changing behaviour [86,94,121].

3.2.2. Targeting and Personalisation

The most effective framing may depend on the individual's motivational orientation, with loss-framed messages being slightly more effective for prevention-focused individuals [86]. A clear theme throughout the literature is that there is no one-size-fits-all approach to effectively communicating FBDG. Instead, the targeting of communications to specific population groups, considering differences in physical, social, cultural, religious and envi-

ronmental factors that influence dietary choices as well as relatable language and symbols, is advised [75,76,109].

Cultural tailoring of communications is a strategy used by some food and beverage industry actors to promote consumption of unhealthy products. One study assessed the content of 85 video advertisements for sugary beverages, aimed at African American and Latino populations [111]. The researchers observed that cultural tailoring is both "surface" level, for example, the language, ethnicity, gender and clothing of characters in the advertisement and "structural", incorporating the values, beliefs or norms shared by a particular cultural group.

Currently, approximately 13% of the adult population in the UK identify as an ethnic minority [122]. Therefore, the cultural acceptability element of sustainable healthy diets should be a consideration for FBDG communications. Efforts have been made to produce culturally tailored versions of the Eatwell Guide for African and Caribbean and South Asian populations [123,124]. However, these are local efforts which have not been incorporated into the wider Eatwell Guide communication strategy and also do not take the environmental impact of the recommendations into account. Further research in this field is recommended to identify the role of cultural tailoring and how this can be incorporated effectively, taking into account competing sustainability-related aims.

In addition to cultural tailoring, it is useful to be able to personalise generic FBDG based on an individual's characteristics. For example, the Irish national FBDG communications include nutritional guidance and daily meal plans aligned with the recommendations, for characters of different age, gender and life stage [112]. Alternatively, the USA MyPlate communications include an online tool which calculates tailored food-based dietary recommendations, based on the national FBDG and biometric data inputs such as age, gender and activity level [114].

Currently, the UK Eatwell Guide offers generic FBDG plus daily energy and nutrient intake recommendations for different population groups [23]. However, these nutrient recommendations may not be well understood by the majority of the population and FBDG are considered to be more accessible [23,77]. Therefore, an improvement to the Eatwell Guide communication strategy could be to offer additional food-based recommendations for different population segments, aligned with the established Eatwell Guide food groups.

Verain et al. also highlighted that food choice motives vary between individuals, segmenting consumers into three categories: (a) pro-self consumers, motivated more by health, taste and cost factors; (b) conscious consumers, scoring higher on sustainability-related motives; and (c) average consumers giving similar importance to the two [88]. The researchers observed that health and sustainability-related messages only changed dietary behaviour in the conscious consumer group who were already motivated by that factor.

For this reason, differing motivating factors should also be considered when communicating FBDG to increase adherence to the recommendations, especially for population groups who are not highly motivated by health or sustainability factors alone [88].

3.2.3. Visual Representation and Food Groups

In addition to dietary messages, the majority of national FBDG are also depicted in visual form, showing the proportion of various food groups in a healthy, balanced diet [8]. Visual elements such as colourful graphics and text boxes, dark bullet points, bold print and borders are typically more appealing [76]. The majority of national FBDG use illustrations of food rather than more realistic images or photographs [81]. This was also implemented in the Eatwell Guide, following consumer research [19].

There is variation in the visual model and food groups portrayed, with the most common visual styles being food pyramids and plates, such as in the Eatwell Guide [7–9]. Other cultural symbols are used, such as the Japanese spinning top and the food pagoda of China [7]. Compared to pyramids, plate models of FBDG are perceived by consumers to be more motivating, memorable and actionable [7]. As a result, the most recent revision of the US FBDG involved switching from a pyramid to a plate model [105].

The ability of plate model FBDG to portray the variety, proportionality and moderation of food groups, as well as their usability, has been recently reviewed [81]. Overall, the plate model was viewed as effective; however, key considerations are the lack of portion size guidance, how to portray non-core foods and the importance of emphasising that the plate proportions represent the overall diet and not every meal [81]. Consumer testing of the Eatwell Guide, carried out by Define Research and Insight, indicated a good understanding and usability of the visual style across socio-economic groups and the layout and messaging makes clear that the plate represents the diet as a whole [19].

In contrast to the Eatwell Guide, 36% of FBDG include HFSS foods within the main visual, the remaining FBDG either include them outside of the graphic or not at all [8]. A notable exception is the Brazilian FBDG which categorise foods by the level of processing (fresh foods and minimally processed foods; ingredients - oils, fats, salt and sugar; processed foods; and ultra-processed foods) rather than by nutritional characteristics [115]. However, UK-based consumer research during development of the Eatwell Guide highlighted that including HFSS foods outside of the main plate graphic was interpreted as intended [125].

The most common food groups depicted in national FBDG are fruits and vegetables; dairy; wholegrains; and protein foods, which is used as an umbrella term for foods higher in protein such as legumes, eggs, poultry, fish, meat, nuts and seeds [8]. Certain foods are included in multiple food groups, such as legumes, which are considered as both a protein source and as a vegetable in the Australian and UK FBDG [18,113], although this does not appear to negatively impact Australian consumers' understanding [65].

On the other hand, in the recent revision of Canada's national FBDG, meat, dairy, eggs, legumes, nuts and plant-based meat and dairy alternatives were combined into a single protein food group with the recommendation to consume plant-based more often [117]. This change later raised the concern about consumers' understanding and ability to implement the new FBDG and additional educational resources have been recommended to ensure nutrition literacy in this area and avoid misinterpretation [71]. Fernandez et al. recommended that the FBDG should provide education for consumers on "how to select and prepare nutrient-rich protein foods from a variety of sources" [71].

There is some variation across European FBDG; for example, Mediterranean countries highlight regional foods such as olive oil, fish and nuts as separate food groups [8]. The Nordic Diet Recommendations also recommend foods originating from the Nordic region, representing the importance of cultural and environmental factors in our food choices [126]. Currently, there is no mention of regional foods within the Eatwell Guide communications; therefore, this may be an area for further exploration as local and seasonal foods form part of sustainable diets recommended by UK experts [35].

This would also need to be balanced with cultural acceptability as highlighted in the previous section, representing one area where trade-offs between different elements of sustainability may be required. Overall, the current visual representation of FBDG and food groups in the Eatwell Guide communications appear to be well understood but there is opportunity to bring awareness to foods with a lower environmental impact within the existing structure.

3.2.4. Addressing Barriers and Benefits

Although important, awareness and understanding of dietary guidelines does not necessarily lead to their implementation as other factors influence food choices and can be barriers to adopting sustainable healthy FBDG [127]. For example, in a recent survey of 7590 participants from 10 European countries, taste and enjoyment of meat were two of the most commonly reported barriers to consuming more plant-based foods [128].

Perceived barriers, including daily habits, lack of willpower, time and taste preferences, impact adherence to recommendations for specific food groups in the Swiss national FBDG [127]. Differences in the correlation between perceived barriers and adherence to FBDG were observed; for example, time constraints appeared to be a stronger barrier to con-

suming adequate vegetables and fish for younger participants, and for males, perceived lack of willpower and gluttony impacted adherence to guidelines for meat consumption [127].

FBDG should also communicate the benefits of consuming healthy and environmentally sustainable foods, for example, highlighting that seasonal produce is often Available online a lower price [88]. Similarly, legumes could be promoted as a filling, affordable, versatile, convenient, nutritious alternative to meat [60]. The US MyPlate FBDG communication provides fact sheets for specific foods, highlighting their benefits and tips for incorporating them in a balanced diet [114]. Recommending healthier and more sustainable substitutes for those foods which should be limited according to FBDG is a preferred communication method for consumers [56].

Taste and enjoyment play a significant role in our food choices and we primarily consume foods we see as pleasurable [79]. Kronrod et al. stressed the importance of generating emotions of pleasure when promoting healthy foods to overcome the perception that unhealthy foods taste better [108]. Diets aligned with sustainable healthy FBDG have been shown to have a more neutral taste profile, compared with typical diets which may give the impression these foods are bland or unappealing [129]. Effective communication of FBDG will need to change this perception and promote tasty and enjoyable ways to consume a sustainable healthy diet in order to drive large-scale behaviour change.

Effective FBDG communications must also aim to change social norms around dietary patterns [95]. It has been proposed to use social marketing strategies, employed by some sectors of the food industry, to promote FBDG, focusing on the elements of pleasure and enjoyment [79]. The US-based Healthy Choices Catch On social marketing campaign was successful in increasing physical activity and fruit and vegetable consumption via television, SMS and social media campaigns as well as traditional billboards and print materials [118]. The Change4Life national obesity prevention campaign in England, now the Better Health: Healthier Families campaign, was also based on social marketing techniques and was effective at increasing awareness of the campaign, although engagement with the campaign was low [119].

Social marketing can therefore play a role in communicating FBDG to the public. To be effective and engaging the content must be relevant to the target audience. For example, not all individuals are motivated by preventing disease or reducing their environmental footprint, therefore highlighting other short-term, tangible benefits, such as improved fitness and mental health, may be preferable, especially for younger individuals who may be more motivated by these factors than by longer-term disease prevention [64].

The Australian, Canadian and Brazilian FBDG communications address barriers such as availability, cost, time, lack of cooking skills and the temptation of unhealthy food advertising [69,113,115,117]. Currently, Eatwell Guide communications do not adequately address the benefits of and barriers to adopting the recommendations.

3.2.5. Practical Tools and Resources

In addition to communicating nutrition information, tools and resources are needed to translate knowledge into action by supporting consumers to adopt the recommendations. Elderly adults in particular have reported a need for meal planning, shopping and home cooking advice to help them adhere to FBDG [55]. A good example of this is the Brazilian FBDG which include holistic recommendations for buying, preparing, cooking and eating food to support the population to develop positive food habits [69,115].

An effective strategy is to communicate information and develop skills in an online format via educational videos, infographics, fact sheets and posters [63,71]. The Irish FBDG online communication strategy includes examples of daily menu plans for different food groups to demonstrate how the recommendations can be tailored to individual needs [112]. The US MyPlate website also offers specific resources for various population groups as part of their dietary guideline communication strategy, including nutrition tips and guidance on label reading and shopping on a budget [114].

In the UK, several resources are available for families as part of the Better Health: Healthier Families campaign including a recipe database, a sugar intake calculator and a phone application offering healthy food swap suggestions for use whilst food shopping [49]. These are useful practical resources; however, further resources are needed to meet the needs of other population groups and to provide resources for those looking to adopt a more sustainable diet with a lower environmental impact.

Another commonly reported issue is that individuals lack practical understanding of appropriate portion sizes for key food groups recommended in sustainable healthy FBDG such as fruit and vegetables [58,74], legumes [60] and wholegrains [72]. Serving sizes on nutrition labels are often not aligned with dietary guidelines and do not reflect variations in nutrition requirements between different population groups [101]. Clear and consistent guidance on serving sizes and consumption frequency is necessary to support consumers to adopt FBDG.

Serving sizes are most effective when related to common objects or well-understood household measures rather than weights [89]. The US, Ireland and the Netherlands FBDG communications include detailed serving sizes and frequency for each of the food groups, tailored to various population groups [112,114,116]. Energy equivalent serving sizes are also provided for different foods within each group, as recommended by Faulkner et al. [89].

3.2.6. Communication Channels

Another key element of communicating FBDG is the channels through which the messages are communicated. Social media has emerged as an important channel for communicating and seeking nutrition information, particularly for young adults but also for other population groups [66,82]. Social media enables dynamic campaigns encouraging audience engagement which has been employed for public health campaigns [102].

Popular public platforms such as Facebook and Instagram are used to deliver nutrition-related content and also as part of larger interventions alongside other tools such as closed online support groups, SMS reminders and smartphone apps for behaviour and progress tracking [82]. However, there is currently limited evidence that social media is effective at driving behaviour change, at least in the context of weight loss. Until now, campaigns have focused on health improvement alone; therefore, more research is needed to determine the effectiveness of social media campaigns for driving change towards more sustainable healthy diets.

A common issue with using social media for nutrition communication is that health organisations and nutrition professionals typically do not reach as large an audience or receive as much audience engagement as food industry brands and social media influencers, such as celebrities and lifestyle bloggers, who currently dominate the online space [59,62]. Food industry brands, many of which promote foods not aligned with sustainable healthy FBDG, typically have a much larger marketing budget and are able to create effective social media advertising campaigns that appeal to the public and create social norms around consuming their products [62].

Consumers report confusion and a lack of trust due to conflicting information being communicated on both mass and social media [91,100,103]. If emerging science, which may not align with current FBDG, is reported out of context or inaccurately in the media, it can add to consumer confusion [77]. Trustworthiness, credibility and authenticity of social media spokespersons is important to the public [61]. There is evidence that social media influencers with a smaller audience (<10,000 followers) have a higher level of audience engagement than larger brand profiles [66].

Some of the strategies employed by social media influencers to build trust with their audience and communicate nutrition information include providing realistic practical advice; using a range of media such as photos, videos, blog posts and infographics; and including a relatable character who represents the social norms and values of the target audience [66]. Strategies associated with higher engagement on Instagram, which has

overtaken Facebook as the most popular platform, include content with a positive and encouraging tone, use of humour and links to further information [62].

The popularity of different platforms and the most effective strategies differ between population groups. It is therefore recommended to use appropriate communication channels and tailored messages and communication strategies for the target audience [59,109]. In addition to social media, the majority of individuals obtain nutrition information from traditional media, in particular television, newspapers and the internet [92,110]. Older adults report that medical practices, supermarkets and community groups are the optimal places to communicate FBDG [55].

Supermarkets have been identified by consumers as a preferred environment for nutrition education and real-life experiential learning [98]. Labels on supermarket products are one existing way in which information about the nutrition and environmental impact of different foods can be provided to consumers [68]. However, over-simplification of complex data and lack of trust in labelling schemes may impact consumers' use of nutrition and eco-labels on food products [68]. In the UK, there is currently no agreed standard for eco-labels on food products, which is a necessity if it is to form part of the communication strategy to promote sustainable healthy diets [130].

Scaciota et al. have developed an extensive guide proposing 31 strategies, validated by experts in consumer behaviour, food retail and communication, to support retailers in promoting a healthy food environment, based on the Brazilian FBDG [70]. They proposed approaches such as prime placement and promotions of healthy food, provision of information sheets and recipes, in-store tastings and other community events to boost sales. If aligned with sustainable healthy FBDG, such strategies may be a useful way to indirectly communicate the recommendations to the public.

A systematic review concluded that supermarket tours, where consumers are educated on healthy food purchases and label reading by a trained facilitator, are an effective tool to increase nutrition knowledge and change dietary behaviour, although high-quality data from long-term studies are needed [78]. Supermarket tours have the benefit of being real-time, two-way communication whereby the facilitator can adapt the information to meet the needs of the participants and similarly, the participants have the opportunity to ask questions and clarify information [106]. Until now, supermarket tours have focused on improving nutrition outcomes; however, they could also be expanded to educate participants on how to purchase and prepare both healthy and sustainable food.

To summarise, it is recommended to engage a range of communication channels when communicating FBDG, particularly to make use of the digital space and supermarkets, using the most appropriate channels to engage with specific target groups.

3.2.7. Multi-Level Approach

Finally, according to the socio-ecological model of health, an individual's values, beliefs and attitudes are shaped by several levels of society, from policy to community to institutional to interpersonal and finally, individual, with effort and funding needed across all these levels to effectively communicate FBDG [110]. To build public trust, collaboration is needed between scientists, leaders, health professionals, the food industry and public influencers to consistently communicate evidence-based nutrition information aligned with FBDG [109].

We acknowledge that although nutrition communication plays a significant role in changing individual knowledge, attitudes and intentions, these wider factors significantly influence the adoption of FBDG and should be considered in parallel to an effective communication strategy. Food and agricultural policies need to support implementation of FBDG, for example, by improving access to and affordability of healthy food [107] and restricting media and retail promotion of foods not aligned with FBDG [67].

Furthermore, this review has highlighted that more rigorous evaluations of FBDG communication and implementation strategies are needed to better inform future efforts [105]. This includes consumer testing during the development process as well as formal evalu-

ation of promotional material, campaigns and other communication strategies to justify funding and ensure resources are used effectively [69,131].

Multi-level strategies to move towards a more sustainable healthy UK food system were set out in the National Food Strategy independent review, for example, defining clearly how rural land should be used, improving nutrition education in schools, prioritising provision of sustainable healthy food in government institutions and setting long-term targets to improve the sustainability of the food system [132]. However, many of these proposals were not addressed adequately in the following Government Food Strategy, published in June 2022 [133].

4. Recommendations for Communicating the Eatwell Guide

This review highlighted several approaches for effective communication of FBDG which are currently lacking in the Eatwell Guide communications. Five recommendations which could be employed as part of an improved strategy to communicate the Eatwell Guide are discussed below.

Recommendation 1: Review of language and tone of nutrition and sustainability-related messages

The language of current and future Eatwell Guide key communications should be reviewed to ensure that it is short, simple, specific and easy to understand including a combination of gain- and loss-framed messages. The preferred tone of communications should be empathetic and empowering rather than prescriptive and authoritative. Consumer research and testing has been carried out for the current Eatwell Guide visual model, but it is important that this is also carried out more widely and for future communications to ensure that they are clear, consistent and appropriate for the level of nutrition literacy of the target audience. We also note the lack of specific messages relating to sustainability, despite the recommendations offering both health and environmental benefits.

Recommendation 2: Targeting of FBDG and communications to specific population segments

A common theme in the research is that communication of the Eatwell Guide needs to be tailored and appeal to different population groups, including age, gender, cultural background and motivation style. Our second recommendation is therefore that further research is needed to identify specific target population segments and analyse the factors which influence their food choices as well as the messages, symbols and communication channels which are most relevant and engaging for these individuals. This research should then be used to inform more targeted future communications around sustainable healthy diets. Additionally, providing tools to personalise the generic FBDG is a strategy employed by other countries which would be a useful addition to the Eatwell Guide communication strategy.

Recommendation 3: Addressing barriers to and benefits of adopting the Eatwell Guide recommendations

The review highlighted the importance of not only presenting information but also addressing barriers to adopting the recommended dietary behaviours. Commonly identified barriers to improved diets in the UK include taste preferences, cost, time and habits. Providing guidance for following the Eatwell Guide on a budget and preparing meals which align with the guidelines in less time are some examples of how barriers to adopting the Eatwell Guide could be addressed as part of an improved communication strategy. Other barriers need wider policy action, such as improving access and affordability of foods aligned with sustainable healthy FBDG and limiting promotion of unhealthy and unsustainable foods in the media and retail spaces. Promoting healthy and sustainable diets as tasty and pleasurable is a key learning from food industry marketing strategies.

Recommendation 4: Development of practical tools and resources to support implementation of the guidelines

Further resources to support the practical implementation of the Eatwell Guide are necessary to support consumers to adopt the recommendations. Resources reported in the

literature include portion size guidance for various population groups, healthier and tasty substitutions for unhealthy and/or unsustainable foods and guidance on purchasing and preparing meals in alignment with the guidelines, such as recipes and example meal plans. Compared to other countries' FBDG communication strategies, the UK is currently lacking in this area.

Some of these practical resources are provided for families via the NHS Better Health: Healthier Families website. However, it is important to provide tools for adopting a sustainable healthy diet for various population groups and via a consistent and reliable source. Practical information could be communicated online, via infographics, posters and short educational videos as well as distributed in public spaces. Implementing this recommendation requires funding and support from policy makers as well as collaboration between health and sustainability professionals to ensure that the information provided is evidence-based and trustworthy.

Recommendation 5: Leveraging social media and social marketing techniques to increase public engagement

Social media and the internet are now the primary way many individuals communicate and obtain information. Therefore, leveraging social media and the digital space should form a key part of the Eatwell Guide communication strategy, alongside traditional media. Learning from social marketing techniques and communication strategies used by the food industry and lifestyle influencers may be a useful approach when designing communications aimed at driving dietary behaviour change towards sustainable healthy diets.

5. Conclusions and Further Research

It is clear that improved communication is needed to drive adherence to the UK FBDG, the Eatwell Guide. Currently, the majority of the population do not eat according to these recommendations. A widespread shift from current UK diets to those in alignment with the Eatwell Guide is necessary to lower the incidence of non-communicable disease and reduce the national dietary environmental footprint.

This review highlights multiple elements which should be taken into account when communicating the Eatwell Guide to the public, health professionals and other stakeholders. The strengths of this study are that the review is broad, covering nutrition communication in a holistic manner and from a variety of perspectives. The review sets out clear recommendations for improving communication of the Eatwell Guide and clearly summarises the current literature in this field. The findings of the review may also be explored further and applied to other national and international FBDG.

One key limitation is that many of the sources included in the review are focused on health rather than sustainability, although there is much overlap between healthy and environmentally sustainable diet recommendations. Due to the limited timeframe of the study, the search terms were narrow, returning publications relating to nutrition and dietary guideline communication but fewer relating to sustainability.

There is very limited research currently available relating specifically to communication of sustainable diets. However, additional review of the literature relating to communication of non-dietary sustainable behaviours may also provide useful insights. Further limitations include a lack of high-quality and quantitative data, perhaps due to limited resources for the formal evaluation of FBDG communication strategies.

To summarise, the current Eatwell Guide communication strategy is lacking in comparison to other high-income countries. Investment is needed in this area to improve UK FBDG communications by incorporating strategies such as the recommendations set out in this review. Further research is recommended to provide the detail needed to implement the recommendations made in this review. In particular, research into the motivations, perceived barriers and preferred communication style for target population groups and a more detailed analysis of social marketing and industry strategies which could be adapted to promote sustainable healthy diets.

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Abbreviations

FBDG	Food-based dietary guidelines
FAO	Food and Agriculture Organisation
WHO	World Health Organisation
GHGe	Greenhouse Gas Emissions
NDNS	National Diet and Nutrition Survey
PHE	Public Health England
NHS	National Health Service
HFSS	High fat, salt and sugar

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