CUES

CONSUMERS' UNDERSTANDING OF EATING SUSTAINABLY

D2.2

Report on how the communication of influential factors is related to consumers' sustainability perception, attitudes and behaviours

KU Leuven

31/05/2025

Funded by the European Union

Document Information

Issued by:	KU Leuven
Issue date:	30 May 2025
Due date:	31 May 2025
Work package leader:	KU Leuven
Dissemination level:	PU - Public

Document History

Version	Date	Modifications made by
1	25/04/2025	First draft version for quality review
2	12/05/2025	Feedback and suggestions received by the two quality reviewers
3	30/05/2025	Final version submitted to the EC

Authors

Organisation	Name(s) of author(s)
KU Leuven	Boen, H., Glenisson L., Hallez L., Smits T.
University of Valencia	Küster, I., Lluch, M.I., Vila, N.
University of Zagreb	Dabić, M.

Quality Reviewers

Organisation	Name(s) of reviewer(s)
University Hospital Heidelberg	Hsiung C.
Q-Plan International	Argyropoulou K., Gerotziafa M.

Executive Summary

Achieving a sustainable food system is crucial for both human and planetary health, yet current consumption patterns are increasingly contributing to environmental degradation, social inequalities and economic imbalances. While consumers are just one element of the broader food system, their choices have an important impact on driving change. Understanding the factors that influence their behaviours is key to facilitating a shift toward a more sustainable food system.

This report presents a **review of academic research** on individual, social, economic and environmental factors shaping consumers' sustainable food outcomes (e.g., their perceptions, attitudes, intentions, behaviours). It reviews the role of **individual factors**, such as consumers' knowledge, values and emotions. It also captures **social factors** (e.g., consumers' social norm perceptions) and **economic factors** (e.g., consumers' perceptions of price and affordability). It also reviews the role of the broader **food environment**, with a specific focus on the digital food environment (e.g., online platforms and apps related to sustainability). The report offers an overview of the existing research landscape, detailing what and who has been studied in this field, and the evidence connecting individual, social, economic and environmental factors to consumers' sustainable food outcomes. These food outcomes pertain to the environmental, social and economic dimensions of food sustainability. The insights from academic research are complemented with insights from **grey literature** (i.e., national food guidelines) to shed light on cultural influences that may shape consumers' sustainable food behaviours.

By synthesizing these findings, this report serves as a **foundation for the CUES project**, guiding our future research efforts and contributing to the transition towards a more sustainable food system. In particular, insights related to vulnerable populations and other subgroups that are a central focus within CUES will help guide and inform our future research efforts involving these groups.

Table of Contents

Figures

List of Tables

List of Terms and Definitions

Table 1: Terms and definitions

Acronym	Meaning
CUES	Consumers' Understanding of Eating Sustainably
EU	European Union
PROSPERO	International Prospective Register of Systematic Reviews
GMO	Genetically Modified Organism
WDI	World Development Indicators
E-COMMERCE	Electronic Commerce
E-WOM	Electronic Word Of Mouth

1. Introduction

Food plays a fundamental role in both human and planetary health, yet current food consumption patterns are increasingly harming our environmental, social and economic systems. On an environmental level, the main impacts of the food system include greenhouse gas emissions, with the current food system accounting for approximately one third of global emissions, water pollution and a loss of biodiversity (Reisch et al., 2013). On a social level, poor-quality diets are a major contributor to non-communicable diseases, accounting for 75% of all diseases and 85% of deaths in Europe, significantly increasing healthcare costs (European Public Health Alliance et al., 2019). In the meantime, approximately 280 million people worldwide are facing severe food insecurity and suffering from hunger (European Commission, 2024). Furthermore, economically, the global food system is dominated by a few large corporations, leading to an unequal distribution of profits at the expense of many smaller, fragmented actors in the food supply chain. These interconnected issues underscore the **need for a large-scale shift towards a more sustainable food system**. To facilitate this shift, **the CUES project** uses scientific methods to effectively communicate sustainability-related information to consumers, guide their knowledge and behaviour, and identify the most persuasive cues to encourage sustainable choices that benefit the environment, society and the economy. While consumers represent only one part of the broader food system, their collective actions play a critical role in driving this transformation. As such, it is important to explore how individuals can be encouraged and empowered to alter their consumption patterns, enabling them to contribute to more sustainable food practices.

The factors that influence consumers' sustainable food outcomes (e.g., their perceptions, attitudes, intentions, behaviours) are complex and multifaceted, spanning individual, social, economic and environmental factors. On the individual level, psychological factors such as consumers' sustainability-related knowledge and attitudes play a role in shaping their food outcomes. On the social and economic levels, perceptions of consumers' social environment (e.g., beliefs about the behaviours and expectations of others) and economic considerations (e.g., perceived price and affordability of sustainable food) can either support or hinder their sustainable food outcomes. At the same time, various factors in their food environment play a role in shaping these outcomes. Notably, the digital food environment is becoming increasingly impactful, with the rise of online platforms, web shops offering sustainable options and apps providing sustainability-related information. Although research on food sustainability is expanding, a comprehensive understanding of these factors remains limited, hindering the development of effective policies, interventions and communication strategies to promote sustainable food behaviours. To address this gap, this report compiles **findings from systematic reviews examining academic research on individual, social, economic and environmental factors influencing consumers' sustainable food outcomes.** This is supplemented with findings from grey literature. In particular, we examined the national food guidelines from five EU countries (i.e., Hungary, Spain, Belgium, the Netherlands and Greece) to provide a broader perspective on the factors influencing consumers' sustainability outcomes. This also allowed us to assess whether the governmental focus on food sustainability aligns with the academic focus on this topic.

By systematically analysing existing empirical research, these reviews provide a **comprehensive overview of the current evidence base while highlighting areas that require further study.**

Understanding these influences will allow CUES to refine its research approach, ensuring that future work is relevant and impactful. For instance, the findings related to vulnerable populations and other stakeholders will inform and guide our research efforts focused on these groups. Ultimately, these reviews will be the foundation of the CUES project and facilitate the transition towards a more sustainable food system.

2. Methods

This section outlines the methodology of the review studies, covering the different stages of the research process. It begins with the pre-registration of the review protocol. Next, it outlines the inclusion and exclusion criteria used to determine relevant studies, followed by a description of the search and screening process. Finally, it explains the approach to data extraction and analysis, highlighting how the findings were systematically integrated to identify key insights and research gaps.

2.1 Review protocol

At the start of the project, **a protocol for the review studies was pre-registered in PROSPERO** (i.e., the International Prospective Register of Systematic Reviews) under case number CRD42024538965. This pre-registration promotes transparency by clearly documenting the objectives, methods and planned analyses before the review begins, in line with the project's commitment to transparency and open science principles. It also allows for greater accountability, as researchers and stakeholders can refer to the predefined criteria and approach. The complete protocol can be found in Annex 1.

2.2 Inclusion and exclusion criteria

Specific inclusion and exclusion criteria were applied to guide the screening process, consistent with our preregistered protocol (see Annex 1). **Eligible studies were peer-reviewed journal articles published in English between 2014 and 2024.** This timespan was chosen because of the noticeable rise in scientific interest in sustainable food consumption that emerged around 2014 and has continued to grow since (Kristia et al., 2023). Non-peer-reviewed articles and other publication types, such as review articles, meta-analyses, conference abstracts, dissertations, books and book chapters, were excluded to ensure reliability. Studies needed to examine the relationship between one or more individual, social, economic or environmental factors and consumers' sustainable food outcomes (e.g., their perceptions, attitudes, intentions, behaviours). The behavioural component could include a range of food-related actions, such as the choice, purchase and consumption of sustainable foods. **Both quantitative and qualitative research designs were eligible**, and studies could be conducted in laboratory or natural settings. The reviews accepted broad definitions of "sustainable food" to reflect its multidimensional nature, encompassing environmental, social and economic aspects. Studies focusing on food and non-alcoholic drink outcomes within these dimensions were included. However, studies on GMO's (Genetically Modified Organisms) were excluded due to differing views on their sustainability. There were no exclusion criteria regarding the population of research; this review welcomed populations of all genders, ages, nationalities, education levels, geographical situations and socio-economic backgrounds. This inclusive approach allowed us to gain insights into the factors influencing sustainable food outcomes across diverse backgrounds, including those of vulnerable populations. However, studies were excluded if they primarily focused on populations with specific diseases or disorders (e.g., diabetes, cancer, disordered eating) or clinical populations (e.g., hospital inpatients), comprising more than half of the sample, as these factors may influence eating behaviours through dietary restrictions or medical advice.

2.3 Search and screening process

A **comprehensive search string** was developed to identify relevant articles (see Annex 2). This search string included a range of keywords related to individual, social, economic and environmental factors. Relevant keywords were selected through an examination of the food sustainability literature and in collaboration with the project partners. To identify studies related to individual factors, keywords such as *knowledge*, *values*, *concern*, *gender*, etc. were included. For social factors, keywords such as *social influence, social identity, community influence, work environment,* etc. were included. Economic factors were captured by included keywords such as *price, income, financial status*, etc. For studies related to environmental factors, the search string incorporated keywords such as *social media*, *applications*, *retail*, *labelling,* etc. Additionally, keywords related to the outcomes of interest, such as *perceptions*, *attitudes*, *intentions*, and *behaviour*, were included. The search string was piloted in Web of Science. Based on the results, the search string was refined and tailored for use in two additional databases: Scopus and PubMed. This multi-database approach helped ensure a comprehensive and diverse range of studies.

This search method yielded a total of 12 942 articles across the three databases (see Figure 1). The first step involved removing duplicate records, resulting in a refined set of 10 524 unique articles. Next, a title and abstract screening process was carried out, leading to the exclusion of 9 334 articles that did not meet one or more of the inclusion criteria. However, articles with any uncertainty were retained for full-text screening. Following this process, 1 208 articles remained for further consideration. These remaining articles covered a range of topics related to individual, social, economic and environmental factors. Therefore, this group of 1 208 articles was further subdivided, based on abstract screening, into different categories, with some overlap existing between categories.

For the first review category, full-text screening identified 290 articles focusing on **psychological state variables** (i.e., dynamic personal variables such as consumer knowledge, norms, perceptions, attitudes and values). These variables encompass individual, social and economic factors that are potentially related to consumers' sustainable food outcomes. For the second review category, 57 articles were selected that examined the **digital food environment** (i.e., variables related to digital platforms such as e-commerce and social media). These articles focus on environmental factors that are potentially related to consumers' sustainable food outcomes. These two review topics became the primary focus of our research efforts, offering valuable insights into the relationship between individual, social, economic and environmental factors and consumers' sustainable food outcomes.

Given the diversity of relevant topics remaining after title and abstract screening, we identified three additional categories that could provide further insight into the factors influencing sustainable food outcomes. As a result, we decided to include these topics in supplementary reviews. First, we identified 220 potentially relevant studies related to the **social environment**. Although social factors were also addressed in the first review category (i.e., psychological state variables), the volume and focus of studies related to the social environment warranted a separate, dedicated review. While the initial review primarily explored individual-level perceptions of the social environment, this additional review adopts a broader perspective. Specifically, it considers both consumers' perceptions of their social environment and the actual social environment in which they are embedded, including community influences and social networks. After full-text screening, 210 articles remained for inclusion. A bibliographic review was then carried out to outline the research trends related to these social factors. Second, we identified 290 potentially relevant studies investigating **individual trait variables** (i.e., stable

personal variables such as gender, income and broader socio-economic status). After full text screening, 289 articles remained for inclusion. An integrative review was carried out to map the research field and identify critical gaps for future research. Third, 519 potentially relevant articles were identified related to the **physical food environment** (i.e., factors such as labelling, packaging, television, etc.). These articles will undergo full-text screening to identify studies that meet the inclusion criteria. As this supplementary review is still in progress, its results are not included in this report.

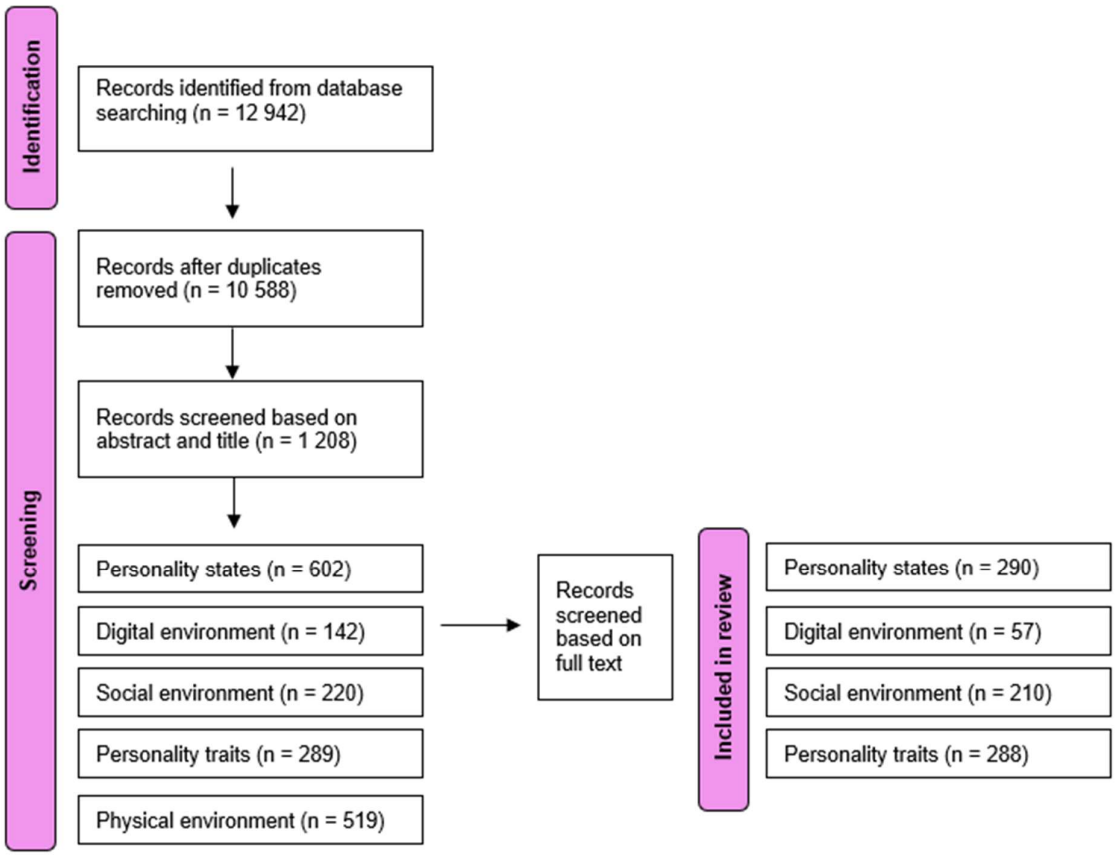

Figure 1. Overview of the screening process and study selection

2.4 Data extraction and analysis

A data extraction form was developed to capture relevant study characteristics, including authors, year of publication, country of data collection, population details (e.g., sample size, sampling method, age, gender), predictor variables, theoretical frameworks, outcome variables (e.g., food type, consumer outcome type) and results (e.g., analysis techniques, quantitative and/or qualitative findings). Authors were contacted to obtain missing information. Following data extraction, we also assessed the quality of the included studies.

For the reviews on psychological state variables and the digital food environment, a narrative synthesis was carried out to integrate and interpret the study findings. This approach enabled a structured and coherent integration of insights from both quantitative and qualitative studies, offering a comprehensive

overview of how individual, social, economic and environmental factors shape consumers' sustainable food outcomes. Multiple consortium members were involved in data extraction and analysis to ensure consistency and accuracy. For the social environment, a bibliographic review was conducted using two main methods. A performance analysis was carried out to identify the most common authors, journals and countries in the field. Additionally, a co-word analysis was carried out to map the key research themes and their evolution over time. Finally, for the psychological state variables, a multiple correspondence analysis (MCA) was carried out on the final article sample to identify key research themes and reveal the structural landscape of the field.

3. Results

3.1 Psychological states

This systematic review synthesizes the academic evidence on the relationship between psychological state variables and consumers' sustainable food outcomes (i.e., attitudes, intentions, behaviour). The findings are organised into two main sections: (1) study characteristics outlining the scope and volume of the existing research and (2) an overview of the existing evidence on how psychological state variables shape consumers' sustainable food outcomes.

Psychological state variable: a personal characteristic (e.g., attitude, knowledge, emotion, perception) that can change over time depending on the situation or context a person experiences.

3.1.1 Scope and volume of research

The 290 articles included in this review were published between January 2014 and April 2024. Figure 2 shows the number of articles published in that period. There has been a notable increase in peer-reviewed articles about this topic in the last few years, particularly since 2019. This is demonstrated by the publication of 175 studies between 2021 and April 2024, compared to just 44 studies in the initial four years (2014-2017). Studies from 2024 only cover the first four months (up to April), which explains the lower number of articles for that year. When examining the study methods, most used a quantitative research method (93.0%), whereas a smaller number used a qualitative method (5.4%) or mixed research method (1.7%).

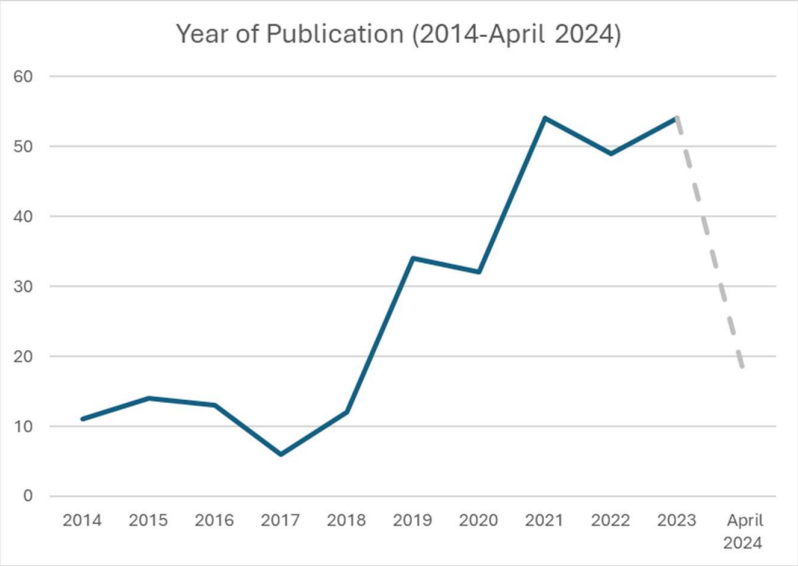

Figure 2: Number of studies over time related to psychological state variables

A total of 66 different countries were represented in the articles, including 30 cross-national studies. The majority of studies were conducted in high- or upper middle- income countries (74.6%), such as China, Italy, Turkey and the United States (WDI – *The World By Income And Region*, 2023). In contrast, a smaller number of studies were conducted in countries classified as low- or lower middle- income countries (25.3%) such as India, Pakistan or Vietnam (see Figure 3).

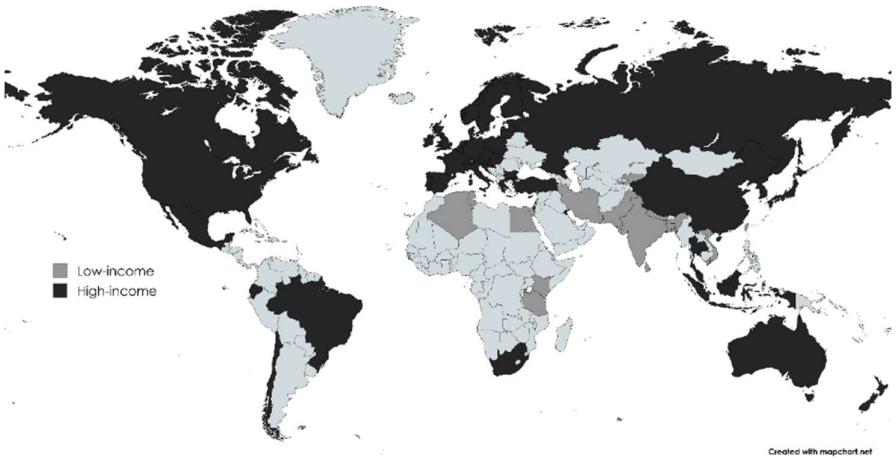

Figure 3: Countries in which studies were performed related to psychological state variables

In terms of demographics, most studies achieved a balanced representation of men and women, though some had a slight overrepresentation of female participants. The majority of studies included participants from a broad age range, covering a significant portion of the adult population. However,

11.3% of the studies specifically targeted a particular age group or generation, with a primary focus on young adults or middle-aged consumers (e.g., students, Gen Z, Millennials). Vulnerable populations were notably underrepresented in these studies. Only one study focused on children (5–21 years) and one study focused exclusively on older adults (65+ years). Similarly, no studies were found that specifically focused on individuals from lower socio-economic backgrounds, leaving this vulnerable group largely overlooked.

A wide variety of sustainable food types was observed across these articles, ranging from specific food products (e.g., sustainably labelled coffee) to the assessment of participants' overall dietary intake. We categorized these sustainable food types into five different categories. The largest category, which encompassed more than half of the studies, focused on organic foods (67.6%). This was followed by studies focusing on sustainable protein consumption (17%), for instance studies on reducing meat consumption or increasing the intake of more sustainable alternatives. A third category, overall sustainability (7.0%), did not concentrate on a single food type but instead evaluated the sustainability of consumers' overall dietary pattern. The fourth category covered socio-economic sustainability foods (5.1%), such as local food consumption and fair-trade products. Finally, a small subset of studies (3.3%) examined other sustainable food products that did not fit within the previous categories. Examples included sustainable palm oil and seaweed-based products.

3.1.2 Relationship between psychological state variables and consumers' sustainable food outcomes

We identified eight overarching categories of psychological state variables that were investigated in relation to consumers' sustainable food outcomes (see Table 2). These categories include attitudes, subjective norms, perceived behavioural control, perceived barriers and resources, pro-social values, individualistic values, self-identity and emotions. For some categories, subcategories were also identified (e.g., food literacy as a subcategory of perceived barriers and resources). Table 2 presents the frequency with which these variables were investigated, along with the number of studies that found a significant relationship between these variables and consumers' sustainable food attitudes, intentions or behaviours. One single article often investigated multiple predictors and outcomes (i.e., attitudes, intentions, behaviour) in the same study. As such, one study may be counted in multiple rows if it addressed more than one variable. The next section then provides a short discussion of the results for each category, integrating findings from both quantitative and qualitative studies.

Table 2: Overview of psychological state variables as predictors of sustainable food outcomes

Predictor	Recurrence in studies (% of total studies)	Significant predictor of attitudes	Significant predictor of intentions	Significant predictor of behaviour
Attitude	n = 155 (52.0%)	/	n = 133/137 (97.1%)	n = 24/27 (88.9%)

Environmental attitudes	n = 8 (2.7%)	/	n = 5/6 (83.3%)	n = 0/4 (0.0%)
Subjective norms	n = 96 (32.2%)	n = 9/14 (64.3%)	n = 64/79 (81.0%)	n = 7/10 (70.0%)
Perceived behavioural control	n = 96 (32.2%)	/	n = 69/91 (75.8%)	n = 17/22 (77.3%)
Perceived barriers and resources (total)				
Food literacy				
Food literacy knowledge	n = 61 (20.5%)	n = 23/27 (85.2%)	n = 18/23 (78.3%)	n = 15/17 (88.2%)
Food literacy skills	n = 5 (1.7%)	/	n = 1/3 (33.3%)	n = 0/3 (0.0%)
Trust	n = 36 (12,1%)	n = 7/7 (100%)	n = 16/19 (84.2%)	n = 7/10 (70.0%)
Price				
Price perception	n = 27 (9.1%)	n = 6/9 (66.7%)	n = 8/13 (61.5%)	n = 7/9 (77.7%)
Price consciousness	n = 7 (2.3%)	n = 1/3 (33.3%)	n = 1/1 (100%)	n = 3/3 (100%)
Availability	n = 19 (6.4%)	n = 1/1 (100%)	n = 7/11 (63.6%)	n = 7/8 (87.5%)
Time	n = 4 (1.3%)	/	n = 1/4 (25.0%)	n = 1/1 (100%)
Prosocial values (total)				
Moral value	n = 24 (8.1%)	n = 1/2 (50.0%)	n = 18/19 (94.7%)	n = 3/3 (100%)
Environmental value	n = 92 (30.9%)	n = 14/25 (56.0%)	n = 33/44 (75.0%)	n = 18/25 (72.0%)
Animal welfare value	n = 11 (3.7%)	n = 3/4 (75.0%)	n = 2/2 (100%)	n = 3/4 (75.0%)
Social welfare value	n = 9 (3,0%)	n = 1/1 (100%)	n = 3/4 (75.0%)	n = 3/3 (100%)

Schwartz' values (universalism)	n = 3 (1,0%)	n = 1/1 (100%)	/	n = 2/2 (100%)
Individualistic values (total)				
Health value	n = 86 (28.9%)	n = 19/22 (86.4%)	n = 40/45 (88.9%)	n = 15/21 (71.4%)
Food safety value	n = 23 (7.7%)	n = 7/8 (87.5%)	n = 7/10 (70.0%)	n = 3/5 (75.0%)
Self-identity	n = 15 (5.0%)	n = 4/4 (100%)	n = 9/9 (100%)	n = 5/5 (100%)
Emotions	n = 27 (9.1%)	n = 3/3 (100%)	n = 20/21 (95.2%)	n = 1/2 (50.0%)

1. Attitudes

Attitude was the most frequently studied category (52% of all studies), often examined within the framework of the Theory of Planned Behaviour (Ajzen, 1991). Nearly all studies found a positive relationship between favourable attitudes and consumers' sustainable food intentions and behaviours. This includes increased purchase intentions for organic and fair-trade products, as well as a greater likelihood of reducing meat consumption. Qualitative studies supported these findings. General environmental attitudes were found to be less predictive of sustainable food outcomes compared to product or behaviour-specific attitudes, with five out of eight studies finding no significant relationship, particularly for behavioural outcomes. Overall, the evidence suggests that consumers' attitudes toward specific sustainable products and behaviours are strong predictors of their sustainable intentions and actions. This highlights the importance of targeting these attitudes to promote sustainable food patterns.

2. Subjective norms

Subjective norms were also frequently examined (32.2% of all studies), also often within the framework of the Theory of Planned Behaviour. Subjective norms refer to the perceived social pressure to engage in sustainable food behaviours. A significant positive relationship was found in most of the studies, indicating that stronger perceived social influence supports more sustainable food attitudes, intentions and behaviours. The source of this social pressure also plays a role, with some studies showing that the perception of family influence is more impactful than peers or colleagues. However, findings vary, as one study suggested that cultural and family norms can discourage plant-based diets, while peer influence and social media can promote their acceptance. Overall, the evidence supports the role that these subjective norms can play in promoting sustainable outcomes among consumers.

3. Perceived behavioural control

Perceived behavioural control, i.e., the belief in one's ability to perform a behaviour and having the necessary resources, was examined in a portion of the studies (29.9% of all studies), frequently within the Theory of Planned Behaviour framework. A significant positive relationship between perceived behavioural control and sustainable intentions and behaviours was observed in the majority of the studies. This means that the more control consumers perceive over their food-related behaviours, the stronger their intentions or actions towards sustainability. Perceived behavioural control was a significant predictor across various sustainable food types, such as organic food, fair-trade, meat reduction and overall sustainable food choices.

4. Perceived resources, opportunities and barriers

Studies also reported on perceived barriers and resources to sustainable food consumption. Frequently mentioned variables included perceptions of food literacy, trust, price, availability and time.

- **Food literacy:** Food literacy, which encompasses both food-related knowledge and skills, was studied in 22.2% of all studies and was found to play a significant role in consumers' sustainable food outcomes. Knowledge about sustainable products was a significant positive predictor in nearly all studies, particularly in relation to organic food, plant-based diets and local food consumption. More broadly, general knowledge about sustainability and the environmental or health consequences of food choices was related to sustainable behaviours in most studies. Qualitative findings further emphasized the importance of consumer awareness in shaping sustainable behaviours. However, while food literacy skills, such as cooking abilities, were only significantly linked to sustainable food choices in a small number of the quantitative studies, qualitative research suggests they can be an important factor in facilitating sustainable eating habits.

- **Trust:** Trust in certification and origin of products was examined in a portion of the studies (12.1%), mainly for organic and labelled products. A positive and significant association between trust and sustainable food outcomes was found in most studies. Qualitative studies highlighted trust as particularly relevant for organic foods due to a perceived lack of regulation surrounding these foods. Retailer reputation was also mentioned as being important for building trust.

- **Price:** Price-related variables (e.g., price-consciousness (2.3% of all studies), perceived price (9.1% of all studies)) were commonly identified as barriers, mostly for organic food. When organic food was perceived by consumers as expensive, a negative relationship with consumption was found, while perceiving it as "worth the price" showed a positive relationship. Additionally, price consciousness (i.e., the degree to which the consumer focusses exclusively on paying low prices) showed mixed relationships with organic food outcomes. These findings suggest that perception of price, rather than the actual cost, plays a more important role in organic food consumption. In contrast, the relationship between perceived price and plant-based food consumption or meat reduction remained unclear as there were mixed findings across the quantitative and qualitative studies, highlighting the need for further research in this area.

- **Availability:** The perceived availability and convenience of sustainable food products (6.4% of all studies) were positively associated with sustainable food outcomes in most studies. Conversely, perceived limited availability was frequently identified as a barrier, particularly in qualitative studies focusing on plant-based food and sustainable palm oil.

- **Time:** Time pressure (e.g., not having enough time to cook or purchase sustainable food) as a barrier (13% of all studies) showed mixed results in quantitative studies, with only half of the studies finding a significant relationship. However, qualitative studies indicated time restraints as an important barrier to eating more vegetarian meals and reducing meat consumption.

5. Prosocial values

Prosocial values describe actions taken for the benefit of others without expecting personal gain. In the context of sustainable food consumption, these values indicate that consumers seek food choices that will benefit others, such as the environment, animals or farmers, with minimal consideration for personal gain. Several subcategories of prosocial values could be distinguished and are discussed below.

- **Moral values:** Moral values (8.1% of all studies), which encompass internalized beliefs and a sense of moral obligation to engage in altruistic or sustainable behaviours, were positively and significantly associated with sustainable food outcomes in nearly all studies examining this factor.

- **Environmental values:** Environmental concern was investigated in 30.9% of the studies, with most finding a significant positive relationship with sustainable food outcomes. Qualitative studies also supported this influence but highlighted the role of ambivalence in meat reduction. While many consumers expressed a desire to protect the environment by eating less meat, conflicting factors (such as the enjoyment of meat or health concerns) often prevented them from putting their values into action.

- **Animal welfare values:** Animal welfare concern (3.7% of all studies) showed a positive and significant association in nearly all quantitative studies investigating this factor, primarily related to plant-based alternatives and meat reduction, as the meat industry directly impacts animal welfare conditions. Qualitative studies also reinforced the importance of these concerns.

- **Social welfare values:** Social welfare concern (3.0% of all studies) refers to a general concern for the welfare of other people and society. This factor showed a significant and positive association in nearly all studies, often in the context of organic, local and fair-trade food. Qualitative studies also underscored their positive role.

- **Schwartz' universal values:** Three articles (1.0%) explored whether there was a consistent set of underlying universal values that occur across different contexts and cultures that influenced various sustainable food behaviours. One shared value, i.e. Schwartz' universalism value,

focusing on "understanding, appreciation, tolerance, and protection for the welfare of all people and for nature", was found to underlie both organic and plant-based food consumption. This suggests that people who believe that protection for people and planet is very important may be more likely to engage in behaviours that comply with these beliefs, such as sustainable food consumption.

6. Individualistic values

Individualistic values pertain to self-interests or personal benefits, such as minimizing one's own suffering or harm or improving one's health. The following individualistic values were distinguished.

- **Health values:** 28.9% of all studies investigated health values as a predictor. Most articles that included this variable aimed to predict organic food outcomes. In nearly all of these articles, health concerns showed a significant and positive association with organic food outcomes. These findings suggest that consumers who are more worried and concerned about their health, have a more positive inclination towards buying and eating organic food. Qualitative studies also identified health consciousness as a driver for organic food choice. However, the association with meat reduction and plant-based alternatives was less clear, with mixed findings in both quantitative and qualitative studies.
- **Food safety values:** Food safety concern (7.7% of all studies) was a significant positive predictor for organic food consumption in most studies investigating this factor. However, it was not a significant predictor for local food or plant-based meat alternatives in the examined studies.

7. Self-identity

Self-identity (5.0% of all studies), defined as the set of roles a person assumes and which continuously shapes actions aligned with their self-concept, was found to be significant in nearly all studies, with one study only partially confirming this relationship. Its influence on sustainable behaviour can be both positive and negative, depending on how consumers perceive themselves (e.g., as meat-eaters versus vegetarians). These findings suggest that consumers tend to choose products that align with their self-identified values and lifestyle.

8. Emotions

Finally, a subset of the articles (9.1% of all studies) investigated the impact of consumers' emotions on their sustainable food outcomes. Key emotions included pleasure, pride, guilt, fear, and disgust. Anticipated emotions significantly influenced behaviour, with expectations of positive emotions encouraging sustainable choices and expectations of negative emotions deterring unsustainable actions. Similarly, experienced emotions were strongly linked to sustainable food outcomes, with positive emotions increasing intentions to buy sustainable food and negative emotions reducing them.

Qualitative studies confirmed these findings, highlighting emotions like pride, satisfaction, guilt, and disgust as motivators for sustainable choices, while the pleasure of eating meat acted as a barrier to reducing meat consumption.

3.2 Digital food environment

This scoping review synthesizes the academic evidence concerning the relationship between the digital food environment and consumers' sustainable food outcomes (e.g., their perceptions, knowledge, attitudes, behaviour). The findings are organized into two main sections: (1) study characteristics outlining the scope and volume of the existing research and (2) an overview of attributes of digital food environments that shape consumers' sustainable food outcomes.

3.2.1 Scope and volume of research

This review includes 57 articles published between 2014 and 2024. The volume of research on the digital food environment and sustainable food outcomes has grown since 2014, with a notable peak in 2022 (see Figure 4). Quantitative studies such as surveys and experiments dominated the methodologies, while qualitative studies (e.g., interviews, focus groups) and observational studies were less common.

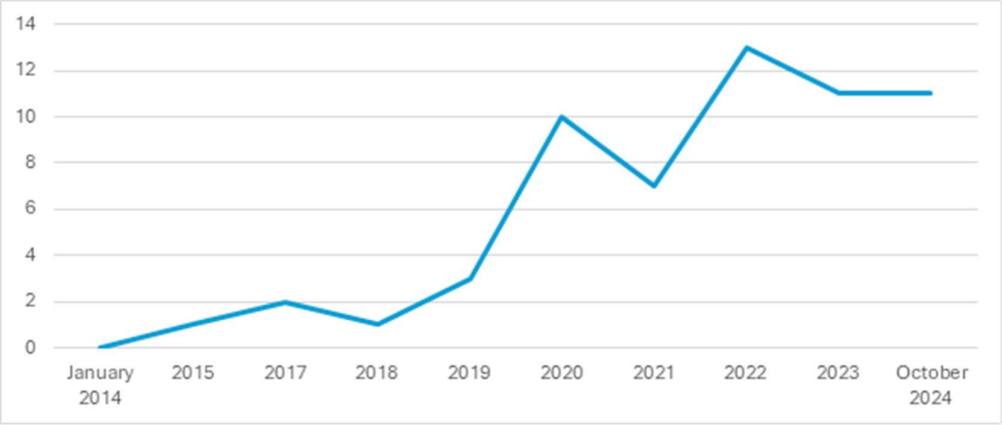

Figure 4: Number of studies over time related to the digital food environment

Most studies (53.1%) were conducted in high-income countries, such as the Netherlands and the United States, with a significant portion (41%) also in middle-income countries such as China and Iran (see Figure 5). No studies were conducted in low-income countries (WDI – *The World By Income And Region*, 2023).

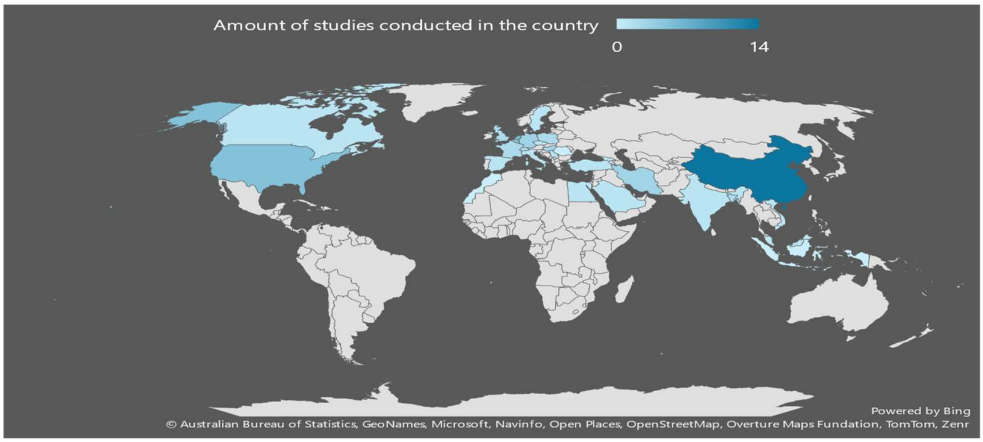

Figure 5: Countries in which studies were performed related to digital factors

Demographically, most studies focused on the general adult population, with a limited focus on vulnerable age groups such as children (< 12 years), teenagers (12 – 18 years) or older individuals (+ 65 years). Women were overrepresented in the samples compared to men. Moreover, the majority of studies included participants with high education levels, overlooking potentially vulnerable groups with lower educational backgrounds. Notably, only a small number of studies provided information on the socio-economic status of their participants, leaving economically disadvantaged groups largely overlooked.

Regarding the digital media outlets, e-commerce (41%) and social media (39%) were the most frequently studied, followed by other media (19%) such as apps, documentaries, live broadcasts and blockchain technology.

E-commerce: Online platforms where consumers can browse and purchase sustainable food products.

Social media: Digital platforms where people share, discuss and promote sustainable food products and practices.

Apps: Mobile applications designed to help consumers make sustainable food choices.

Documentaries: Non-fiction films or videos that educate viewers on topics related to sustainable food.

Live broadcasts: Real-time video streams that showcase sustainable food-related content.

Blockchain technology: A digital system used to enhance transparency and traceability in the sustainable food supply chain.

3.2.2 Relationship between the digital food environment and consumers' sustainable food outcomes

This section summarizes the results regarding the relationship between digital media and sustainable food outcomes among consumers. Digital media attributes were categorized by platform type: e-commerce, social media, and other media (i.e., live broadcasts, apps, documentaries and blockchain).

Table 3 presents an overview of the digital media (sub)categories and their frequency within the final sample of 57 articles. Since some studies examined multiple (sub)categories, they may appear in more than one row.

Table 3: Overview of the (sub)categories of digital media attributes

Attribute (sub)category	Recurrence in studies (% of total studies)	Example
Ecommerce attributes	n = 27 (47.4%)	
E-commerce message strategies attribute	n = 14 (24.6%)	(e.g., product information)
E-commerce platform characteristics attributes	n = 16 (28.1%)	(e.g., usability of e-commerce platform)
Social media attributes	n = 17 (29.8%)	
Social media marketing attributes	n = 7 (12.3%)	(e.g., social media marketing content)
Electronic word-of-mouth and user generated content attributes	n = 8 (14.0%)	(e.g., conversation partner)
Influencer attributes	n = 5 (8.7%)	(e.g., influencer's benevolence)
Other media attributes	n = 13 (22.8%)	
Live broadcast attributes	n = 3 (5.2%)	(e.g., content of live broadcast)
App as sustainable food guides attributes	n = 3 (5.2%)	(e.g., filter function on app)
Documentary attributes	n = 4 (7.0%)	(e.g., documentary with sustainability themes)
Blockchain attributes	n = 3 (5.2%)	(e.g., blockchain food traceability system)

1. E-commerce

E-commerce emerged as the most frequently researched digital medium, with mention in 27 studies (47.4% of all studies). E-commerce attributes were classified into message strategies and platform characteristics.

- **Message strategies:** Message strategies were investigated in 14 studies (24.6% of all studies). E-commerce platforms often used informative content, such as detailed sustainability information about products, environmental impact scores, and nutritional scores, to positively influence consumers' sustainable food attitudes and purchase behaviours. Additionally, inspirational content such as meal plans, shopping lists, and recommendations for sustainable meal preparation proved effective in motivating consumers toward sustainable choices. Normative attributes, including social norm-based feedback (e.g., showing consumers how their choices align with others' sustainable habits) and gamified elements (e.g., rewards for sustainable purchases), were also identified as influential. However, their effectiveness was often enhanced when paired with additional features such as personalized product recommendations or integrated eco-scores that helped consumers make more informed decisions.

- **Platform characteristics:** Characteristics of the e-commerce platform were investigated in 16 studies (28.1% of all studies). The design of these platforms played a considerable role in promoting sustainable food behaviours. Features like transparency in providing product and sustainability details, interactive tools that engaged users, and a platform's overall usability were important in encouraging positive attitudes and behaviours. Convenience-related attributes, such as flexible home delivery options, simple and efficient ordering systems, and an easy-to-navigate interface, were consistently highlighted as critical drivers of sustainable food choices. High platform quality - encompassing system reliability, superior service (e.g., responsive customer support), and well-organised, accurate information - helped enhance consumer trust and willingness to purchase sustainable food. On the other hand, logistical issues such as the inability to physically inspect products, inflexible return or refund policies, and limited availability in certain regions were frequently cited as barriers, discouraging consumers from making sustainable food choices.

2. Social media

Social media was the second most frequently cited digital medium, with reference in 17 studies (29.8% of all studies). Most attributes were related to social media marketing. Social media attributes were grouped into marketing strategies (7 studies, 12.3% of all studies), electronic word-of-mouth (e-WoM) (8 studies, 14.0% of all studies) and influencer endorsements (5 studies, 8.7% of all studies).

- **Marketing strategies:** Social media marketing strategies that incorporated informative and interactive content were found to improve consumers' perceptions of and trust in sustainable food products. For instance, posts or advertisements highlighting product details such as eco-certifications, ethical sourcing or production methods resonated well with audiences and built credibility. Interactive features, like polls, quizzes, or comment engagement, further strengthened consumer trust by creating a sense of involvement and authenticity. However, marketing efforts that focused on customization (e.g., tailoring content to individual user preferences) had a much weaker impact on consumers' attitudes toward sustainable food and did not strongly influence their behaviour.

- **Electronic word-of-mouth (e-WoM):** Positive e-WoM, such as reviews, recommendations, and testimonials shared on social media, generally improved consumer perceptions of sustainable food. However, its influence on actual purchase intentions was minimal, indicating that while e-WoM may raise awareness, it does not always translate into action. Consumers were more likely to trust e-WoM from experts, such as nutritionists or sustainability advocates, than from peers or anonymous users, as expert reviews were perceived as more credible and reliable. Meanwhile, user-generated content (UGC), like customer-created videos or posts about sustainable food products, had mixed results. In some cases, UGC positively influenced attitudes and behaviours, particularly when it was seen as authentic and relatable. However, its effectiveness was inconsistent, as some consumers were sceptical of non-factual or overly promotional content.

- **Influencer endorsements:** Social media influencers played a significant role in shaping sustainable food attitudes and purchase intentions. Attributes such as influencers' self-disclosure, where they shared personal experiences or stories about sustainable food, were particularly impactful in fostering trust and relatability. Parasocial experiences (i.e., the perceived personal connection that audiences feel with influencers) also strengthened consumers' likelihood to adopt sustainable behaviours recommended by the influencer. Additionally, influencers' credibility—rooted in their expertise, authenticity, and perceived benevolence—enhanced both positive attitudes toward sustainable food and purchase intentions. Influencers who were seen as genuine advocates for sustainability, rather than purely promotional figures, were the most effective at driving consumer engagement and behaviour change.

3. Other media

A smaller portion of the articles (22.8%) investigated other types of media, such as live broadcasts (3 studies, 5.2% of all studies), apps (3 studies, 5.2% of all studies), documentaries (4 studies, 7.0% of all studies) and blockchain technologies (3 studies, 5.2% of all studies).

- **Live broadcasts:** Key features of live broadcasts, such as interactivity and authenticity, were found to encourage sustainable food behaviours. Interactivity, in particular, allowed for direct engagement between the broadcaster and viewers, fostering a sense of involvement and connection. Authenticity also played a role in enhancing sustainable food attitudes by presenting real, unfiltered content. However, while authenticity contributed to positive outcomes in some cases, it did not consistently influence attitudes or behaviours, indicating that other factors, such as the content's relevance, may also be important.

- **Apps:** Apps designed to guide sustainable food choices showed positive effects on consumer behaviour through characteristics such as customizability, eco-rankings and filter functions. Customizability allowed users to personalize their food choices based on their preferences, while eco-rankings and filter functions helped consumers quickly identify sustainable options. However, the effectiveness of these apps varied depending on the consistency of the information provided and the potential trade-offs users faced when choosing between options. When eco-

rankings were consistent and trade-off information was clear, sustainable choices were more likely to increase.

- **Documentaries:** Documentaries focused on sustainability themes were effective in raising awareness, changing attitudes and influencing intentions to reduce meat consumption. They provided valuable information on topics such as environmental impacts, animal welfare and health, which motivated viewers to reconsider their dietary choices. However, while documentaries seemed to have an immediate impact on attitudes and intentions, their long-term influence on actual behaviour, such as reducing meat consumption, was more limited.

- **Blockchain:** Blockchain-based food traceability systems were found to enhance trust in sustainable food products by providing transparency about their origins and production processes. This transparency, along with the reliability of blockchain technology, increased consumer confidence in sustainable food choices and positively influenced purchase intentions. The ability to trace a product's journey from farm to table further strengthened trust and encouraged more sustainable purchasing decisions.

3.3 Social environment

This section outlines the results of a bibliographic review on the role of the social environment in shaping consumers' sustainable food outcomes. It highlights 1) the scope and volume of research in this area, and 2) the key themes explored in the literature and how they have evolved over time.

3.3.1 Scope and volume of research

This review includes 210 articles published between 2014 and 2024. Research on the relationship between the social environment and sustainable food outcomes has increased over time, showing a notable rise from 2019 onwards (see figure 6). In response to this shift, this research period was divided into two phases. Period 1 (2014–2018) encompasses publications during the early stages of food sustainability research when fewer than ten papers were published annually. Period 2 (2019–2024) marks a significant expansion of the field, with social factors in food sustainability emerging as a key research focus. The majority of studies used quantitative research methods (88.1%) such as surveys, while a smaller portion employed qualitative methods (8.6%) or mixed methods (2.8%).

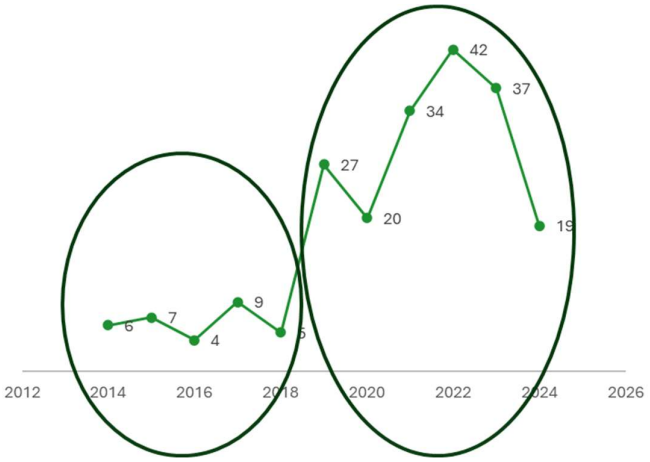

Figure 6: Number of studies over time related to the social environment

A large portion of the studies (39%) were carried out in high-income countries, such as the United States, the United Kingdom and Norway (see Figure 7). However, the majority of studies were conducted in middle-income countries (59%), such as China, India and Pakistan. In contrast, only two studies were carried out in a low-income country, specifically Nepal (WDI – *The World By Income And Region*, 2023).

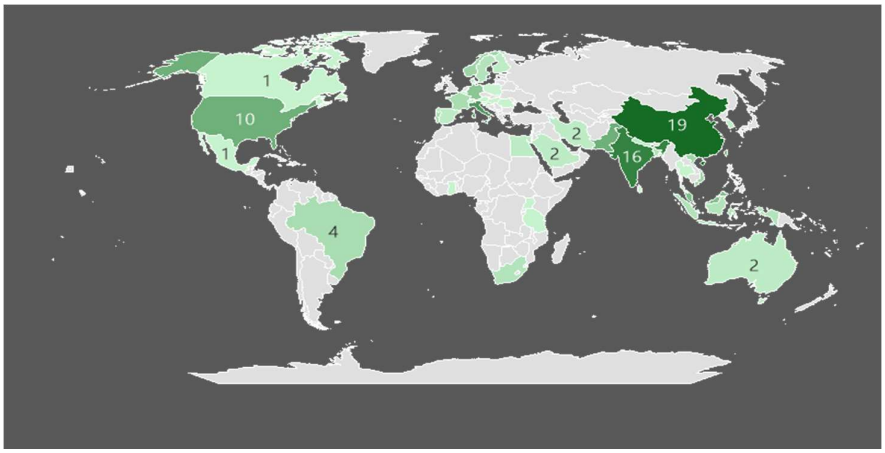

Figure 7: Countries in which studies were performed related to social factors

Demographically, many studies primarily focused on young adults, particularly those between the ages of 18 and 35 years. The age range of participants varied from a minimum of 18 years to a maximum of 80 years. Thus, there was no representation of vulnerable age groups such as children (<12 years) and teenagers (12-18 years) in these studies. Older adults (55+) were also underrepresented. Additionally, female participants were slightly overrepresented in these studies. Regarding the types of food investigated in these articles, the studies focused primarily on organic foods (48%), followed by green foods, plant-based foods and sustainable foods in general.

3.3.2 Research themes

A keyword analysis of the abstracts of 210 research articles focusing on social factors identified five main research themes, each represented by a distinct cluster (see Figure 8). These clusters represent distinct focal points in research exploring how the social environment shapes consumers' sustainable food behaviours. These themes also encompass other factors examined in conjunction with social influences.

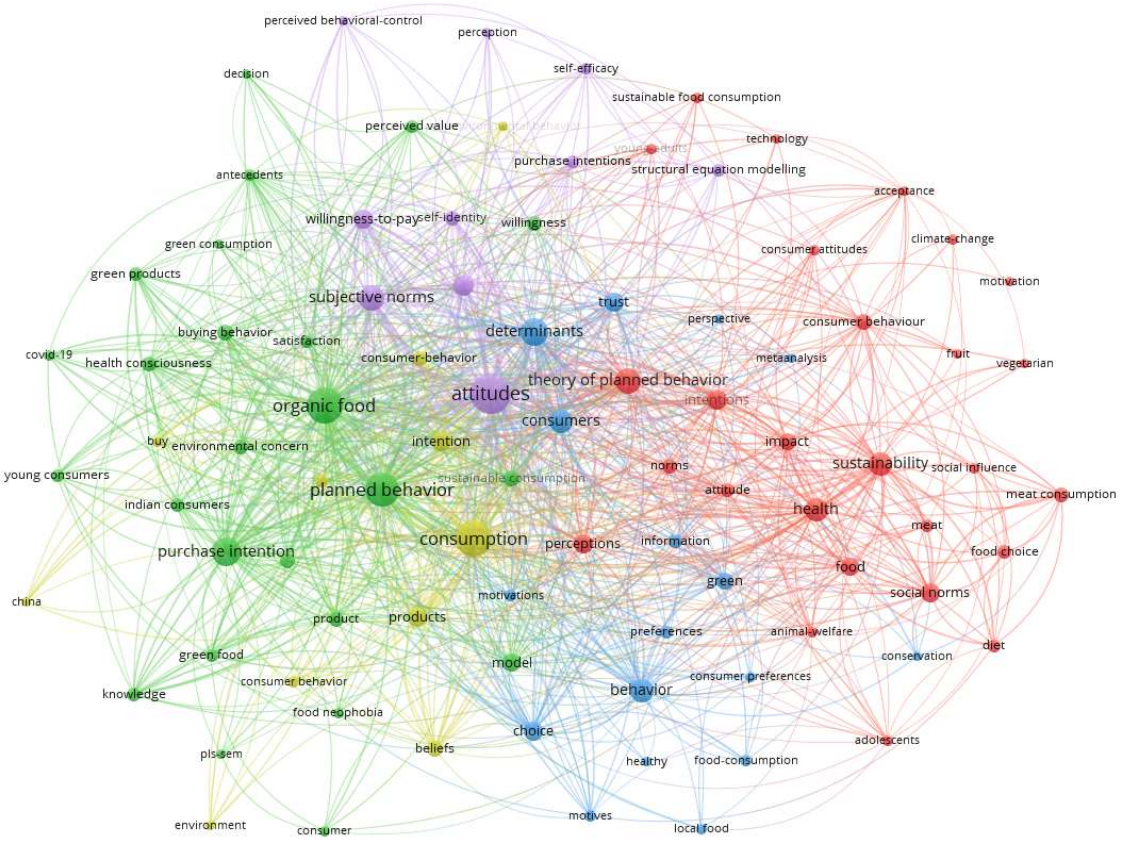

Figure 8: Network visualisation of the occurrence of keywords in articles related to the social environment

1. **Young consumers and sustainability** (red cluster)

This research theme focuses on the role of young consumers, particularly adolescents and young adults, in the transition toward sustainable food choices. Studies in this area frequently examine shifts from meat consumption to plant-based diets, often in relation to concerns about climate change, animal welfare and personal health. Social norms and social influence emerge as central factors driving these changes, with many studies applying the Theory of Planned Behaviour to understand how attitudes and perceived norms shape dietary choices. While individual motivations and perceptions are also discussed, they play a secondary role compared to broader social influences. The most prominent keywords in this cluster are *theory of planned behaviour, health* and *sustainability*.

2. **Organic and green food consumption** (green cluster)

This research theme explores consumer engagement with organic and green food products, emphasizing purchase intentions and willingness to pay. Young consumers, in particular, are again a key demographic in this area. The impact of external factors, such as the COVID-19 pandemic, has also been widely studied within this cluster, particularly in relation to changing attitudes toward organic food. The most prominent keywords in this cluster are *organic food, planned behaviour* and *purchase intention*.

3. **Consumer preferences and motivations** (blue cluster)

This cluster focuses on the psychological and motivational aspects of sustainable food consumption. Research in this area examines why consumers make specific food choices, analysing behavioural determinants and individual preferences for sustainable products. Key areas of interest include green product preferences, health-related factors and the role of consumer trust in sustainability claims. Compared to the other clusters, this body of work places a stronger emphasis on individual motivations rather than social or external influences. The most prominent keywords in this cluster are *determinants, behaviour* and *consumer*.

4. **Consumer behaviour and environmental concerns** (yellow cluster)

This research theme centres on the intersection of consumer beliefs, pro-environmental behaviours and sustainability-driven purchasing decisions, with a particular emphasis on China. Studies in this cluster explore how environmental awareness and values shape consumption patterns, often looking at the role of intention and actual purchasing behaviour. Unlike other clusters that focus on specific product categories (e.g., organic food or plant-based diets), this research takes a broader perspective, investigating general attitudes toward sustainable consumption. The most prominent keyword in this cluster is *consumption*.

5. **Attitudes, perceptions and purchase intentions** (purple cluster)

The final research theme focuses on general attitudes and perceptions toward sustainable food consumption, including factors such as self-efficacy, self-identity and willingness to pay. This cluster includes studies that explore how subjective norms affect purchasing decisions. While the Theory of Planned Behaviour is commonly referenced in this area, this cluster appears somewhat weaker than the others, as it encompasses broad and overlapping themes rather than a distinct line of inquiry. The most prominent keywords in this cluster are *attitudes* and *subjective norms*.

3.4 Psychological traits

This integrative review includes studies investigating how personality traits shape sustainable food consumption and pays attention to the intersection between personality traits and social factors. It addresses a noticeable gap in how existing literature synthesizes and interprets the link between these two factors. The findings are organized into two main sections: (1) a brief overview of the scope and

volume of research and (2) a mapping of the research field, outlining prevalent topics and critical areas for future research.

3.4.1 Scope and volume of research

Over the past years, there has been a noticeable academic interest in the role of personality traits (and social factors) in shaping sustainable food consumption. Like the finding of our other reviews, a notable increase can be noted from 2019 onwards. Around 72% of articles were published in the period from 2020-2024 (see Figure 9).

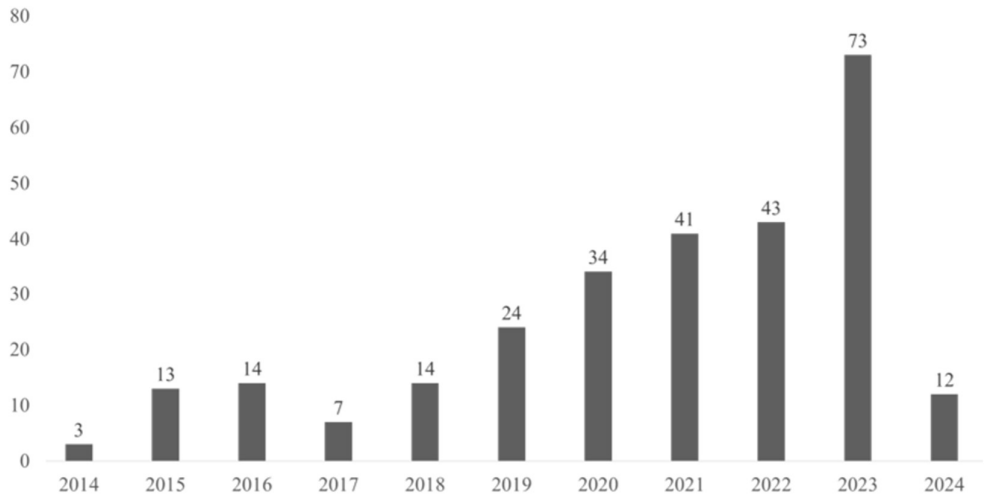

Figure 9: Number of studies over time related to psychological trait variables

3.4.2 Mapping of the research field

To visualize the structure of the field, we conducted a multiple correspondence analysis (MCA) of the selected literature. The resulting proximity map (see Figure 10) reveals key thematic dimensions and highlights how various research topics cluster around shared conceptual ground, offering insights into both well-established areas and underexplored intersections.

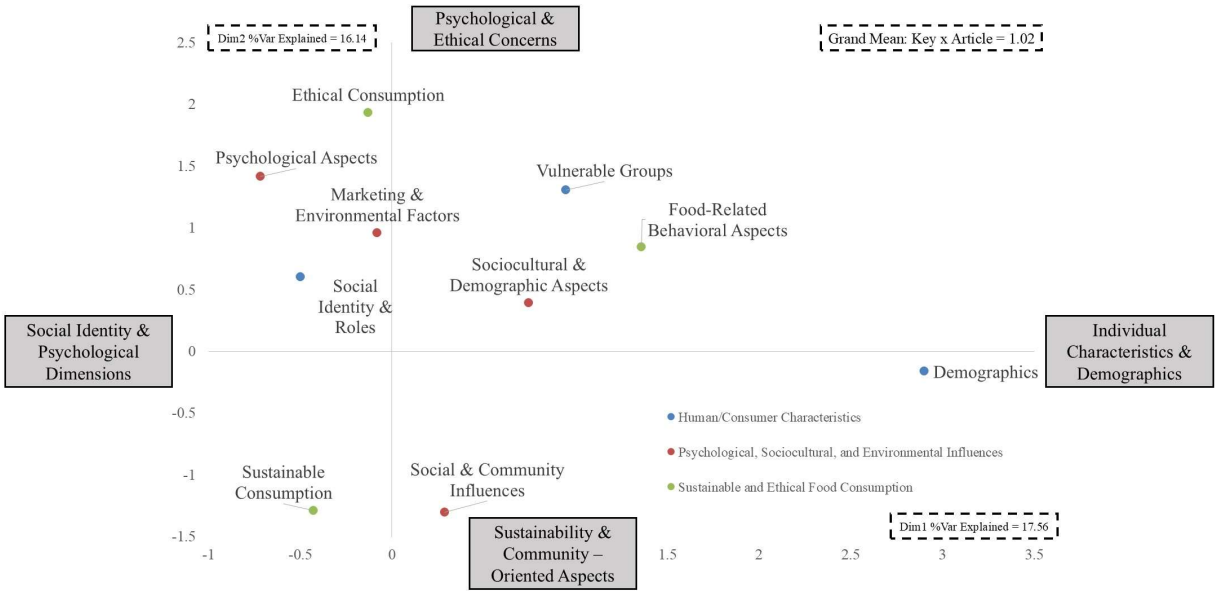

Figure 10: Proximity map of the research field

The horizontal axis (Dimension 1) reflects a spectrum ranging from social identity and community-oriented aspects on the far left to individual characteristics and demographic orientations on the right. The left side includes topics such as Sustainable Consumption, Social Identity & Roles, and Social & Community Influences, which emphasize collective behaviour, value systems, and socially embedded consumption practices. On the opposite end, we find descriptors such as Demographics, Vulnerable Groups, and Food-Related Behavioural Aspects, which are more concerned with personal attributes, segmentation and profiling.

The vertical axis (Dimension 2), meanwhile, contrasts technology- and system-level orientations at the bottom with psychological and ethical concerns at the top. The lower part includes Sustainable Consumption and Social & Community Influences, highlighting frameworks grounded in institutional, macro-level, or systemic perspectives. The upper region includes Ethical Consumption and Psychological Aspects, pointing to themes cantered on values, decision-making processes, and individual moral considerations.

The map also serves as a diagnostic tool: the greater the distance between descriptors, the weaker the conceptual and empirical association between them. This spatial disconnect highlights potential blind spots in the literature, i.e., topics that may share relevance but have yet to be studied in relation to one another. Thus, the proximity map illustrates the current intellectual structure but also surfaces meaningful opportunities for future research across disciplinary intersections.

Focusing further on opportunities for future research, Figure 11 presents the frequency of each topic's occurrence and reveals its distance from the domain centre. Significantly researched topics are

positioned in the top left quadrant, emerging topics are in the bottom left quadrant, and topics that are currently under-researched are in the bottom right quadrant.

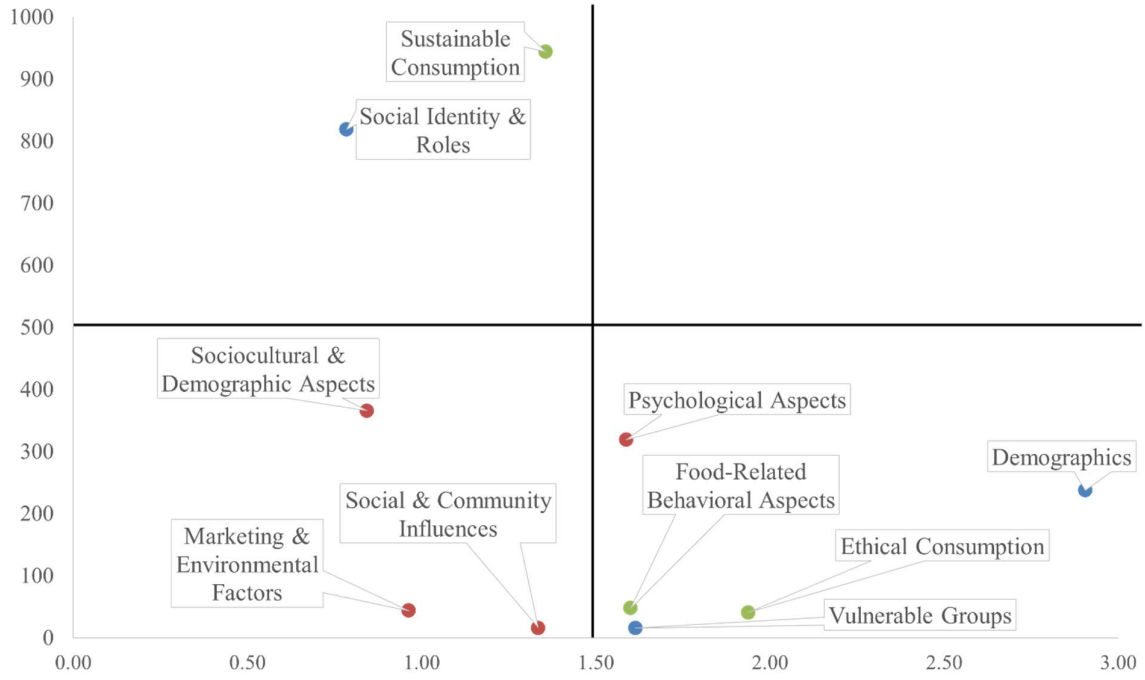

Figure 11. Frequency of research topics

Topics located in the top-left quadrant (such as Sustainable Consumption and Social Identity & Roles) represent areas of high academic attention and strong conceptual alignment with the central themes of the field. These topics are frequently addressed and deeply embedded within the broader discourse on sustainable food consumption, suggesting that they constitute well-established pillars of current research. In contrast, the bottom-left quadrant includes themes like Marketing & Environmental Factors, Social & Community Influences, and Sociocultural & Demographic Aspects. While these topics are conceptually closer to the field's core, their relatively lower frequency indicates that they are still emerging in the literature. These areas show signs of growing interest and may represent promising directions for further exploration and theoretical development.

Topics found in the bottom-right quadrant (including Ethical Consumption, Vulnerable Groups, and Demographics) appear infrequently and are situated further from the conceptual centre. These under-researched themes remain on the periphery of scholarly focus and highlight substantial gaps in literature. Their positioning suggests opportunities for future research to expand the scope of the field and integrate these neglected dimensions more fully. Notably, topics like Psychological Aspects and Food-Related Behavioural Aspects, which occupy a more central horizontal position but lower vertical position, indicate niche but potentially important contributions. Although not dominant in volume, their conceptual relevance to the core themes suggests these areas are worth further theoretical and empirical inquiry, and it can thus be considered a potential avenue for future research.

3.5 Grey literature

To complement the academic literature, we also reviewed grey literature across different EU countries. We relied on national documents and food guidelines to provide further insight into the cultural factors shaping consumers' sustainable food outcomes. Our investigation covered dietary guidelines from five countries (i.e., Hungary, Spain, Belgium, the Netherlands and Greece), reflecting a range of diverse food cultures and geographical regions across Europe. The Northern European region is not represented in this grey literature overview, as no partners from that region were involved in this particular research task. The insights from these national dietary guidelines provide additional context on how sustainability is integrated into public health recommendations across the different countries. By integrating this grey literature, we aim to provide a more comprehensive perspective on the drivers and barriers affecting consumers' sustainable food outcomes.

3.5.1 Overview of national dietary guidelines

- **Hungary**: The Hungarian dietary guidelines (OKOSTÁNYÉR) were recently upgraded to incorporate sustainability considerations alongside general health recommendations. Key aspects include promoting seasonal and locally sourced foods to reduce environmental impact, emphasizing food waste reduction through better meal planning and storage and encouraging a shift toward more plant-based meals by replacing meat with alternatives (e.g., fish, eggs, dairy, legumes, grains and nuts). The guideline uses a circular diagram to visualize recommended food proportions, with additional layers indicating preferred choices within each category.

- **Spain**: Dietary guidelines (Recomendaciones Dietéticas Saludables y Sostenibles) integrate sustainability principles into their recommendations. The guidelines encourage increased consumption of plant-based foods such as vegetables, fruits, and legumes, as well as whole grains over refined options. Olive oil is recommended as the primary fat source, and drinking tap water is preferred due to its lower environmental impact. Additionally, they advise limiting processed meats, saturated fats, sugar, and salt. These recommendations align closely with the Mediterranean diet, which is naturally rich in fresh plant-based foods and fish, while advocating for moderate meat and dairy consumption.

- **Greece:** Guidelines in Greece (Εθνικός Διατροφικός Οδηγός), like those in Spain, follow a Mediterranean dietary pattern. They provide detailed recommendations on food group intake, emphasising high consumption of vegetables and fruits, prioritising whole grains and legumes for balanced protein sources, and encouraging the consumption of white meat and fish over red meat. Unique to the Greek guidelines is the inclusion of cultural and traditional dietary elements, such as fasting practices linked to the Greek Orthodox tradition.

- **Belgium**: The Belgian food guidelines follow a similar approach, promoting plant-based over animal-based foods and discouraging the consumption of low-nutrient, high-calorie foods. The guideline also emphasizes mindful consumption habits, including reducing food waste and

moderating overall intake. Instead of a circular representation, Flanders uses a triangle model (De Vlaamse Voedingsdriehoek) that categorizes foods based on both health and environmental impact, with water at the top as the recommended primary beverage.

- **The Netherlands:** The dietary guidelines (Richtlijnen Goede Voeding) provide clear, quantitative recommendations to encourage a more plant-based diet while still allowing for animal-based foods in moderation. The guidelines advise consuming at least 200 grams of vegetables and 200 grams of fruit daily, incorporating whole grains, legumes, and nuts, while moderating meat intake (especially red and processed meats). Fish is recommended once a week, and dairy remains a staple with suggested daily servings. The guidelines also highlight sustainability aspects, such as choosing plant-based oils over animal fats and reducing sugar-sweetened beverages and alcohol.

3.5.2 Comparison of dietary guidelines

Across all five countries, there seems to be an emphasis on plant-based diets, with a strong push for vegetables, fruits, whole grains, and legumes while discouraging excessive consumption of red meat, processed foods and sugar. **Sustainability has become increasingly integrated into dietary guidelines,** with many countries encouraging seasonal, local products and measures to minimize food waste. The increasing focus on sustainability in national dietary guidelines over the past decade aligns with the growing focus on food sustainability in the academic literature.

However, some variations between the countries exist. The visualization of guidelines varies: Hungary and the Netherlands use circular charts, Belgium employs a triangular model, while Spain and Greece seem to rely more on textual recommendations. Cultural influences also shape these recommendations. Spain and Greece explicitly endorse traditional dietary patterns like the Mediterranean diet, while Hungary and the Netherlands subtly incorporate cultural aspects by promoting local and seasonal foods. Belgium takes a more neutral approach without referencing traditional food habits.

Despite some variations in presentation and specific recommendations, there seems to be a consensus across European dietary guidelines that shifting toward a plant-based diet, reducing food waste and making mindful food choices are key strategies for both health and environmental sustainability. While some guidelines incorporate cultural traditions more explicitly than others, all recognize the growing importance of sustainability in shaping dietary recommendations.

4. Conclusions

This report presents findings from multiple review studies conducted as part of the CUES project, **exploring how individual, social, economic and environmental factors shape consumers' sustainable food outcomes** (e.g., their perceptions, attitudes, intentions, behaviours)**.** The research identified different key factors shaping these outcomes.

On an individual level, consumer attitudes were the most frequently studied and appeared as a promising strategy to foster sustainable intentions and behaviours. The findings emphasized the importance of strengthening attitudes toward specific sustainable foods and behaviours (e.g., supporting local food), even more than focusing on general pro-environmental attitudes. We also identified several potential barriers for sustainable food consumption. Food sustainability knowledge (a component of food literacy) was frequently identified as a key factor, with strong evidence supporting its role in influencing consumers' sustainable food outcomes. However, this can be concerning given that many consumers have limited food sustainability knowledge, and this is even more pronounced among people from low socio-economic backgrounds (Palumbo et al., 2019). Another barrier was the perceived price of sustainable foods, such as organic food products. When sustainable food is seen as 'expensive' rather than 'worth the price,' it can become a psychological barrier to purchasing. This finding highlights the importance of addressing price perceptions to encourage greater adoption of organic and sustainable food choices. Moreover, although some consumers acknowledge the health benefits of plant-based diets, scepticism remains widespread. Therefore, enhancing consumers' understanding of the health advantages of plant-based diets and healthier food alternatives is essential. Overall, these review findings highlight the value of interventions to promote sustainable food behaviours among consumers. **Improving consumer knowledge, addressing price perceptions and enhancing specific attitudes toward sustainable foods can be effective strategies for fostering sustainable food behaviours and driving change in the food system.**

Regarding the food environment, a scoping review provided key insights into how the digital food environment can influence consumers' sustainable food outcomes. E-commerce emerged as the most frequently discussed digital medium. Within this context, information about the environmental impact of food products appeared as a key driver shaping sustainable food behaviours. The usability of an e-commerce platform (such as ease of browsing and product accessibility) were all found to promote positive attitudes towards sustainable food. Several studies also highlighted the importance of features such as visualisation and transparency as drivers of sustainable food behaviours. Additionally, apps designed as sustainable food guides were found to be valuable tools in promoting sustainable food outcomes. Features such as eco-rankings of products helped reduce decision uncertainty, making it easier for consumers to choose sustainable options. These findings highlight the potential of the digital food environment to influence consumer behaviour and promote sustainability. **By integrating clear and accessible environmental information, digital platforms can empower consumers to make more informed and sustainable food choices.**

Regarding the types of food outcomes, most studies so far have focused on organic food consumption. Given the limitations of organic food in addressing sustainability challenges, future research should explore a broader range of impactful sustainability solutions. Insights from the grey literature suggest that the potential of sustainable food types may vary across geographical and cultural contexts. The guidelines from different EU countries align in encouraging a shift from animal-based to more plant-based consumption. However, cultural traditions also play a role in shaping national food practices. For

instance, the Mediterranean diet (rich in plant-based oils, fish and white meats) remains a cornerstone of the culinary heritage in many Southern European countries. Similarly, other countries may place greater importance on locally sourced foods or avoiding food waste, reflecting traditional cultural values. These examples illustrate how **certain sustainable food solutions may be more relevant in certain areas due to deeply ingrained cultural practices and local environmental conditions.**

The reviews also provide insights into trends and developments in research on the individual, social, economic and environmental factors that shape consumers' sustainable food outcomes. All reviews assessed the research landscape from 2014 to 2024, revealing similar patterns and evolutions. Specifically, in the early years of this period, research on food sustainability from a consumer perspective was relatively limited. However, since 2019, there has been a notable increase in studies, reflecting a growing academic interest in this topic. This increased academic focus aligns with a growing societal attention for food sustainability. Notably, a review of grey literature showed that sustainability considerations are increasingly integrated into national dietary guidelines. **This suggests a growing awareness of sustainability issues and a commitment from researchers, policymakers and other stakeholders to understand and promote sustainable food practices.** However, the reviews of academic literature also highlighted several gaps that warrant further attention. The majority of studies have been conducted in high- and middle-income countries, leaving low-income countries significantly underrepresented. **Additionally, much of the research tends to focus on adults from the general population, while vulnerable consumer groups (such as children or older individuals, those with low income or individuals with lower educational backgrounds) are often overlooked.** However, it is particularly important to enhance knowledge and awareness of food sustainability within these groups. To address these challenges, the CUES project is developing interventions aimed at raising awareness and enhancing knowledge of sustainable food practices among vulnerable consumer groups, ensuring these populations are included in the shift toward more sustainable food systems.

5. References

(This list does not include the various articles that were part of the reviews)

European Public Health Alliance, European Chronic Disease Alliance, & NCD Alliance. (2019). Towards an EU Strategic Framework for the Prevention of Non-communicable Diseases (Ncds). https://easl.eu/wpcontent/uploads/2019/05/Final-NCD-Paper-fullversion.pdf

European Commission. (2024). *Global report on food crises: Joint analysis for better decisions*. https://www.fsinplatform.org/sites/default/files/resources/files/GRFC2024-full.pdf

Kristia, K., Kovács, S., Bács, Z., & Rabbi, M. F. (2023). A Bibliometric Analysis of Sustainable Food Consumption: Historical Evolution, Dominant Topics and Trends. Sustainability, 15(11). https://doi.org/10.3390/su15118998

Palumbo, R., Adinolfi, P., Annarumma, C., Catinello, G., Tonelli, M., Troiano, E., Vezzosi, S., & Manna, R. (2019). Unravelling the food literacy puzzle: Evidence from Italy. *Food Policy*, *83*, 104–115. https://doi.org/10.1016/j.foodpol.2018.12.004

Reisch, L., Eberle, U., & Lorek, S. (2013). Sustainable food consumption: an overview of contemporary issues and policies. *Sustainability Science Practice And Policy*, *9*(2), 7–25. https://doi.org/10.1080/15487733.2013.11908111

WDI - The World by Income and Region. (z.d.). https://datatopics.worldbank.org/world-development-indicators/the-world-by-income-and-region.html

Annex 1: Review protocol pre-registration

Drivers and inhibitors of consumers' sustainable food behaviour: A systematic review and meta-analysis on the social, individual, and physical and digital environmental factors

Louise Glenisson, Tim Smits, Lotte Hallez, Ines Küster-Boluda, Natalia Vila-Lopez, Cristina Aragones Jerico, Elisabet Mora Perez, Pedro Canales Ronda, Marina Dabiç, Kosjenka Dumančić

Citation

Louise Glenisson, Tim Smits, Lotte Hallez, Ines Küster-Boluda, Natalia Vila-Lopez, Cristina Aragones Jerico, Elisabet Mora Perez, Pedro Canales Ronda, Marina Dabiç, Kosjenka Dumančić. Drivers and inhibitors of consumers' sustainable food behaviour: A systematic review and meta-analysis on the social, individual, and physical and digital environmental factors. PROSPERO 2024 Available from https://www.crd.york.ac.uk/PROSPERO/view/CRD42024538965

REVIEW TITLE AND BASIC DETAILS

Review title

Drivers and inhibitors of consumers' sustainable food behaviour: A systematic review and meta-analysis on the social, individual, and physical and digital environmental factors

Review objectives

We aim to systematically synthesize the evidence of important social, individual, physical environmental and digital environmental factors on consumers' sustainability perceptions and behaviour. Because of the wide span of this topic and the large database it will generate, the review will be divided into multiple systematic reviews. The exact topics of the separate systematic reviews will be decided after the first screening, when a first categorization of the articles has happened. Overall, the several systematic reviews will give an answer to the following main research questions:

1. What individual factors have the strongest impact on consumers' sustainability perceptions and behaviour?

2. What social factors have the strongest impact on consumers' sustainability perceptions and behaviour?

3. What factors in the physical food environment have the strongest impact on consumers' sustainability perceptions and behaviour?

4. What factors in the digital food environment have the strongest impact on consumers' sustainability perceptions and behaviour?

SEARCHING AND SCREENING

Searches

We will search in 3 relevant social, health, and communication databases:
- Web of Science
- PubMed
- Scopus

Web of Science and PubMed serve as our main databases. Scopus is used as a backup database that will be searched to see if additional literature can be found. Key words associated with the outcomes of interest will be used. The search string will be adapted for all included databases. Eligible study identification will also include manual screening of journals. The reference list of final included studies will be examined to identify other relevant articles. Only peer-reviewed articles that were published in English, between 01-01-2015 and 29-03-2024, will be reviewed.

Study design

Inclusion:
Both quantitative and qualitative research designs will be included. All studies must be peer-reviewed and published in English.

Exclusion:
Review articles, meta-analyses, conference abstracts, dissertations, books and book chapters will be excluded in this review. Studies on interventional programmes will also be excluded as well as studies that don't report on the relationship between the social, individual or environmental factors and the psychological or behavioural outcome.

ELIGIBILITY CRITERIA

Condition or domain being studied

This set of systematic reviews will synthesize literature assessing the effect of social, individual and environmental (physical and digital) factors on sustainable food perceptions and behaviour among the general population.

Population

This set of reviews includes studies conducted among consumers from all ages. There are no exclusion criteria based on gender, age or nationality.
Studies are excluded if they exclusively focus on populations with specific diseases or disorders (e.g. diabetes, cancer, disordered eating,...) or clinical populations (e.g. hospital inpatients), or if they make up more than half of the sample, as these participants may have dietary restrictions or medical advice influencing their eating behaviour.

Intervention(s) or exposure(s)

The aim is to give a complete overview of the social, individual and environmental (physical and digital) factors that have an impact on consumers' sustainable food perceptions and behaviour. Included

studies should at least examine one element of the different factors (social, individual or environmental). The studies should report psychological (e.g., perceptions, attitudes) and/or behavioural (e.g., purchase, consumption) outcome measures.

Comparator(s) or control(s)

not applicable

Context

The studies can either be conducted in a lab setting or in a natural setting.

OUTCOMES TO BE ANALYSED

Main outcomes

The main outcomes include self-reported or observed sustainable psychological (e.g., perceptions, attitudes) and/or behavioural outcomes. The behavioural outcomes concern both the consumption, choice or purchase of sustainable foods. Measures such as willingness or intention to purchase/eat sustainable food are also considered as a main outcome.
Due to the different aspects and definitions of sustainability (economic, social, environmental), we allow studies with different operationalisations of this concept.
Studies focusing on eating behaviour in terms of alcohol or drug use will be excluded.

Additional outcomes

Not applicable

DATA COLLECTION PROCESS

Data extraction (selection and coding)

Study selection:
Two reviewers (LG & LH) will independently screen articles' titles and abstracts. Any disagreement between the reviewers will be resolved by consensus or by a third reviewer (TS). During this initial screening, the database will be divided into different categories that will form the databases for the different reviews. Hereafter, full text of the articles in different categories/databases will be obtained and screened against criteria. This full text screening will be done by different partners, mentioned above (section 8), each for their own category.

The following data will be extracted from the included articles:
1. Title
2. Author
3. Database
4. Year of publication
5. Journal
6. Authors' affiliation
7. Country of data collection
8. Study design
9. Research question(s)
10. Theoretical frameworks of the articles
11. Participants' characteristics

12. Age
13. Gender
14. Ethnicity
15. Socio-economic status (subjective / objective)
16. Sample size
17. Response rate
18. Recruitment method
19. Variables analysed in the study include:
20. Antecedents
21. Mediators
22. Moderators
23. Outcomes
24. Statistical analysis technique (if applicable)
25. Results (among which means, standard deviations, confidence intervals, effect size, p-value, measurement of error…)
26. Implications and recommendations for professionals and managers.
27. Limitations and proposals for future research.

The corresponding author will be contacted in the case of unreported data.
Any disagreement between the reviewers will be resolved through consensus or a third reviewer. Data will be recorded in an excel spreadsheet.

Risk of bias (quality) assessment

The methodological quality of included studies will be evaluated using the Mixed Methods Appraisal Tool (MMAT) (Hong et al., 2018).

PLANNED DATA SYNTHESIS

Strategy for data synthesis

We will conduct a set of systematic analyses and narrative synthesis on the available data and, if possible, supplemented with a meta-analysis. Due to the broadness and heterogeneity of the topic, the meta-analysis will only be performed for one of the several systematic reviews. We will perform a meta-analysis if the included studies are sufficiently homogenous in terms of interventions, subjects and outcome. The inconsistency index I^2 will be used to assess heterogeneity of study results, with a value of $I^2 > 50\%$ indicating substantial heterogeneity. If there is significant heterogeneity, sensitivity analysis will be conducted. If a meta-analysis is not possible, we will conduct a narrative review of the findings.

Analysis of subgroups or subsets

Regarding the systematic review, the amount of articles in the initial database will be so large that they will be divided into multiple categories/subgroups and form separate reviews.
If a meta-analysis is found appropriate for a particular subtopic of the review, subgroup analyses will be conducted (with the use of χ^2 tests for subgroup differences). To examine whether vulnerable groups in the population have differential sustainability outcomes, subgroup analyses will be performed, for example on the following categories:
- Age of the participants (e.g. child vs adolescent vs adult vs elderly)
- Socio-economic status
- Migrant background
- Educational level

REVIEW AFFILIATION, FUNDING AND PEER REVIEW

Review team members

- Ms Louise Glenisson, KU Leuven
- Professor Tim Smits, KU Leuven
- Ms Lotte Hallez, KU Leuven
- Professor Ines Küster-Boluda, University of Valencia
- Professor Natalia Vila-Lopez, University of Valencia
- Assistant\\/Associate Professor Cristina Aragones Jerico, University of Valencia
- Assistant\\/Associate Professor Elisabet Mora Perez, University of Valencia
- Assistant\\/Associate Professor Pedro Canales Ronda, University of Valencia
- Professor Marina Dabiç, University of Zagreb
- Kosjenka Dumančić, University of Zagreb
-

Review affiliation

KU Leuven

Funding source

This review is part of the CUES project, funded by the European Union under GA no. 101136507.- Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Research Executive Agency (REA). Neither the European Union nor the granting authority can be held responsible for them. <\/div>

Named contact

Louise Glenisson.
louise.glenisson@kuleuven.be

TIMELINE OF THE REVIEW

Review timeline

Start date: 15 March 2024. End date: 31 August 2024

Date of first submission to PROSPERO

23 April 2024

Date of registration in PROSPERO

03 May 2024

CURRENT REVIEW STAGE

Publication of review results

The intention is to publish the review once completed. The review will be published in English

Review status

The review is currently planned or ongoing.

ADDITIONAL INFORMATION

PROSPERO version history

- Version 1.1 published on 03 May 2024
- Version 1.0 published on 03 May 2024

Review conflict of interest

None known

Country

Belgium, Croatia, Spain

Medical Subject Headings

Consumer Behavior; Environment; Food; Humans; Social Factors

Disclaimer

The content of this record displays the information provided by the review team. PROSPERO does not peer review registration records or endorse their content.

PROSPERO accepts and posts the information provided in good faith; responsibility for record content rests with the review team. The owner of this record has affirmed that the information provided is truthful and that they understand that deliberate provision of inaccurate information may be construed as scientific misconduct.

PROSPERO does not accept any liability for the content provided in this record or for its use. Readers use the information provided in this record at their own risk.

Any enquiries about the record should be referred to the named review contact

Annex 2: Search string

(((((TS=(Human OR Consumer* OR Adult* OR People OR Senior* OR Man OR Men OR Woman OR Women OR Child* OR Teen* OR Student* OR Adolescen* OR Young OR Boy* OR Girl* OR Gen X OR Gen Y OR Gen Z OR Vulnerable OR low-income OR Marginalized OR Disadvantaged OR Elderly OR immigrant* OR refugee* OR ethnic OR minority OR Indigenous OR unemployed OR customer* OR individual OR family OR household OR father* OR mother* OR parent*))

AND TS=(Character* OR Emotional state OR Personal conviction*OR Political preference* OR Motivation OR Neophobia OR Body image OR weight concern* OR bias* OR heuristic* OR ((Food OR Product OR Taste) NEAR/10 (Preference* OR Appeal OR Access* OR Concern*)) OR ((Environment* OR Sustainability OR Health OR Diet* OR Food OR Nutritional) NEAR/10 (Awareness OR Value* OR Concern* OR Belief* OR Knowledge OR Literacy OR Attitude* OR Perception* OR Habit*))

OR Residence OR Ethnicity OR Cultur* OR Socio-demographic* OR Gender OR Age OR Education* level OR Income OR ((Socio-economic OR Financial) AND (Status)) OR ((Social OR Peer) NEAR/10 (Norm OR Pressure OR Influence OR Identity OR Support)) OR community influence OR work environment OR public policy

OR Store OR Retail OR Supermarket OR market OR Restaurant OR Take away OR Food Environment OR Neighbourhood OR Proximity OR Availability OR ((Environmental OR Outdoor OR Billboard OR In-store OR POP OR "Point of Purchase") NEAR/10 (Marketing OR Advert* OR Ads OR Nudge*)) OR ((Food OR Product) AND (Appearance OR Taste OR Convenience)) OR ((On-pack OR Front-of-Pack* OR Packag*) NEAR/10 (Sustainab* OR Health OR Eco* OR Environment* OR Carbon OR "Carbon footprint" OR Organic OR free-range OR "UTZ certified" OR "B Corp" OR non-GMO OR "animal welfare" OR recycling OR Nutrition*) NEAR/10 (Claim* OR Cue* OR Label* OR Certificat* OR Indicat* OR Symbol* OR Table*)) OR Packaging OR Packag* material OR ((Brand OR product) AND (Logo OR Baseline OR Name)) OR Colo$r OR Image OR Photo OR Visual OR Cartoon OR Language OR Price OR Pricing OR Promotion OR Endorser OR Role Model OR Celebrit* OR Influencer

OR Television OR Movie* OR Series OR Internet OR Website* OR Site* OR Social media OR ((Online OR Digital OR Mobile OR Web-based) NEAR/10 ("Food delivery platforms" OR "Grocery shopping" OR Retail OR "Food vendors" OR "Food marketing" OR Application* OR Apps OR Platform OR Communit* OR Marketing OR Advert* OR Ads OR Advergame*)) OR ((Food) AND (Media OR Content OR Post OR Blog)) OR podcast OR user-generated content OR online interaction* OR digital engagement OR e-commerce))

AND TS=(Zero-waste OR low environmental impact OR Eco-friendly OR Environment-friendly OR Ecologic* OR Green OR Plant-based OR Sustainab* OR Organic OR Seasonal OR Local sourcing OR fair compensation OR fair labo$r OR food equity OR food justice OR food sovereignty OR Fair-trade))

AND TI=(((Food OR Diet* OR Snack OR Drink OR Beverage OR Meal OR Grocer* OR Meat OR Plant-based OR Fruit* OR Vegetable* OR Sustainab* OR Health* OR Nutritious OR Nutrient-dense) AND (Behavio$r OR Consum* OR Select* OR Eat* OR Intake* OR Choice* OR Chose* OR Perception* OR Attitude* OR Purchas* OR Waste OR food recovery))))

NOT TI=(Bacteri* OR hiv OR Diabet* OR Cancer OR Insulin OR Pharmaceutical OR antimicrob* OR Pregnant OR in vitro OR in vivo OR cardiovascular OR neurological OR autoimmune OR antiviral)) AND LA=(English)

CUES

CONSUMERS' UNDERSTANDING OF EATING SUSTAINABLY

GA 101136507

FOLLOW US

Partners

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or European Research Executive Agency. Neither the European Union nor the granting authority can be held responsible for them.

Funded by the European Union