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Carbon Footprint Labelling and Consumer Food Choices: Opportunities and Barriers for Climate-Smart Diets in Bulgaria

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Abstract: Climate change raises pressing questions regarding the environmental impact of food systems. Carbon footprinting could serve as a potential measure to guide climate-friendly food consumption in Bulgaria. This study explores the opportunities and challenges of using carbon footprinting to guide consumer behaviour and promote sustainable consumption. The study, based on a detailed analysis of policy guidelines, international standards (GHG Protocol, ISO 14067, LCA), and national socio-economic conditions, assesses the capacity of the Bulgarian food sector to implement transparent climate reporting. The results show that while European policies such as the Green Deal and the Farm to Fork Strategy provide a helpful context, Bulgaria struggles with limited consumer knowledge, insufficient data infrastructure, and financial constraints for SMEs. Consumer interest in sustainability, especially among young people, is growing. However, behavioural inertia, price sensitivity, and lack of knowledge about eco-labels are hindering widespread adoption. The study concludes that carbon footprint labelling in Bulgaria has great potential to promote climate responsibility. However, this can only be achieved through coordinated political support, public awareness campaigns, technological integration, and culturally sensitive communication. Incorporating carbon footprint labelling into national sustainability policies can trigger a broader shift towards climate-friendly diets and help align public behaviour with long-term environmental goals.

Keywords: climate-smart diets; locavore; climate change; carbon footprint labelling; consumer food choices; customer rights

INTRODUCTION

The growing global crisis caused by climate change has placed unprecedented pressure on public institutions, economic sectors and civil society to take timely and effective mitigation actions. The scientific consensus has confirmed that anthropogenic greenhouse gas emissions play a key role in accelerating climate change, and has identified the relative contributions of major economic sectors. Among them, the food industry is recognized as a significant but complex source of emissions, spanning multiple stages of production, processing, distribution and consumption. Current research indicates that about a third of global energy use and a significant share of greenhouse gas emissions – mainly CO_2, CH_4 and N_2O, are associated with global food systems (Čapla et al., 2025). It is therefore well known that the food industry has a substantial climate impact and that there is an urgent need to address it through a range of policy and technological interventions.

However, what remains underexplored is the role of consumer-based climate information tools – particularly carbon footprinting – in influencing food-related demand and, indirectly, emis-

sions throughout the supply chain. Current climate policy increasingly recognizes the importance of action on the consumption side. However, progress in reducing emissions in the food industry remains limited. The world's growing population, improving living standards, continued reliance on fossil fuels, and rapid industrialization – particularly in East and South Asia – continue to shape mitigation strategies. In addition, the expansion of agriculture in forested areas exacerbates climate change by removing natural carbon sequestration and creating new sources of emissions (Lamb et al., 2021). These developments highlight the need for complementary policies that go beyond production efficiency and target consumer behavior.

In this light, integrating sustainable food choice policies emerges as a promising way to mitigate climate change. Food consumption is no longer just a lifestyle choice. It is a tangible tool that individuals can use to influence environmental impacts. In market economies, consumer behavior significantly shapes production patterns, transportation, and resource use. While access to food from around the world year-round is often seen as a hallmark of technological progress, it also entails significant energy use for transportation, storage, and refrigeration. Without a shift toward more climate-friendly food choices, excessive consumption and associated emissions will continue. Empirical research suggests that increased awareness of climate change – especially in economically developed societies – can now contribute to measurable changes in consumption patterns.

Interestingly, younger demographics, especially university students aged 18 – 23, are increasingly inclined towards sustainable food consumption. This group is increasingly favoring seasonal and local foods that require less energy to transport and store (Kamenidou et al., 2019). In addition to their current purchasing behavior, this group is a future consumer segment likely to shape long-term market developments. The demographic shift towards more environmentally conscious consumers, therefore, presents a strategic opportunity to embed sustainability into the food system.

In the European Union, a sophisticated consumer protection framework is characterized by the availability of detailed information on products, including weight, origin and nutritional value. These established communication practices provide the basis for expanding product labelling to include environmental aspects, particularly carbon footprint information. Enabling consumers to evaluate food not only in terms of price and quality, but also in terms of their climate impact introduces a new dimension of transparency and accountability in market decision-making.

Carbon footprinting builds on established methodological frameworks such as the Greenhouse Gas Protocol product standard, ISO 14064, ISO 14067, life-cycle assessment (LCA), and PAS 2050. These methodologies provide robust, standardized tools for accounting for and reporting emissions throughout the food supply chain (Čapla et al., 2025). Case studies – such as tracking emissions from wheat cultivation to the bread trade, demonstrate the practical utility of such methodologies and their ability to identify emission sites (Čapla et al., 2025). At the policy level, transnational initiatives such as the European Green Deal promote the inclusion of carbon footprint disclosure within broader sustainability and climate change policies to empower consumers and accelerate the transition towards low-carbon consumption patterns (Čapla et al., 2025).

Eastern Europe is a region where food consumption patterns are changing rapidly due to rising living standards, globalization and changing social values. Bulgaria is an example of this development within a post-socialist context characterized by increased consumption and growing environmental pressures from energy consumption and land-use change (Lamb et al., 2021). Despite these developments, public awareness of sustainable food systems and their climate impact is still relatively undeveloped in the Bulgarian market. This gap highlights the potential role of carbon footprint labelling as a communication tool that can support environmentally informed consumer decisions and increase the demand for low-emission foods (Kamenidou et al., 2019).

The concept of climate-friendly food reflects broader societal changes, in which food choices are increasingly driven by health concerns and environmental impacts rather than social esteem or innovation. Promoting a low-carbon diet aligns with European and national standards that support local agriculture and sustainable development. In this context, carbon footprint labelling – tailored to the cognitive and cultural characteristics of Bulgarian consumers – can serve as an effective platform for prioritizing climate-friendly foods at the national level and contribute to long-term climate change mitigation objectives (Čapla et al., 2025).

This study hypothesizes that carbon footprint labelling can act as a viable tool to raise consumer awareness and encourage climate-friendly food choices in Bulgaria. The manuscript aims to explore the potential of carbon footprinting as a policy – and market-oriented tool, to influence food consumption patterns and support climate change mitigation in the Bulgarian context.2.

Carbon Footprint Labeling: Concepts and Methodologies

Design and implementation of carbon footprint labelling depend on rigorous methodologies for accurately measuring food product greenhouse gas emissions. Leading frameworks include the GHG Protocol product standard. It guides the calculation of product and company carbon footprints, and ISO standards (ISO 14064 and ISO 14067), which codify organizational and product GHG reporting requirements (Čapla et al., 2025).

Life Cycle Assessment (LCA) is widely used as an integrated method of environmental impact assessment. It covers all stages of a product's life cycle from raw material extraction through production, distribution, use, and disposal. PAS 2050 also provides a standardized specification for a product's carbon footprint, enabling consistency across studies. Both methods have been successfully piloted in agri-food supply chains, demonstrating their utility in tracing emissions through complex processes and with diverse actors (Čapla et al., 2025).

An example is the wheat-to-bread supply chain, in which detailed footprint reporting has revealed hotspots of emissions, e.g., fertilizer use and baking energy consumption. These results enable the targeting of footprint-reduction interventions, informing producers, policymakers, and consumers (Čapla et al., 2025).

Despite methodological advances, numerous impediments remain to the full measurement of carbon footprints. Data availability and quality are common significant impediments, especially in dispersed, globalized food supply chains where openness and standardization do not exist (Čapla et al., 2025). There is a great variability in farming practices, transportation means, and processing methods. It inhibits the procurement and comparison of data across products.

Besides, budget and technology constraints for small and medium-sized enterprises (SMEs) limit their capacity to conduct detailed carbon accounting, thereby curbing the mass-scale uptake of labelling. Such firms generally lack the budget for data systems, technical expertise, and compliance with international standards, thereby putting them at a disadvantage compared to large entities (Čapla et al., 2025).

Technological innovations offer promising answers to these measurement issues. The new generation of technologies enables environmental approaches like a combination of artificial intelligence, blockchain technology, and Internet of Things sensors. They can significantly improve data precision, traceability, and transparency in food supply chains (Čapla et al., 2025). AI algorithms improve emissions monitoring by optimizing agricultural inputs such as fertilizers and water, reducing waste, and identifying inefficiencies.

MATERIAL AND METHODS

This study uses a multidisciplinary methodological framework that combines environmental assessment standards, analytical review of carbon accounting methods, and empirical social research. The research objectives are: (i) food and related greenhouse gas emissions through the supply chain; (ii) carbon footprinting method-

ologies applicable to the food industry; and (iii) consumer knowledge, attitudes, and behavioral intentions regarding safe food choices. The methodological design integrates both qualitative and quantitative methods to address the research hypothesis.

The environmental assessment component of the study is based on an internationally accepted framework for greenhouse gas accounting. The GHG Protocol product standard, together with ISO 14064 and ISO 14067, serves as the conceptual and analytical basis for assessing carbon footprints at the organizational and product levels (Čapla et al., 2025). These standards provide consistent system boundaries, emission factors and reporting standards, ensuring comparability across food and supply chains. Their use allows for the systematic identification of emission sources throughout the food chain.

Life Cycle Assessment (LCA) is the primary methodological approach for assessing the environmental impacts of food throughout its life cycle. The LCA framework covers raw material procurement, agricultural production, processing, transport, distribution and end use. In parallel, the PAS 2050 specification was reviewed to ensure methodological consistency in calculating a product's carbon footprint (Čapla et al., 2025). These methods are treated as complementary tools, enabling cross-validation of results and alignment with best practices in environmental assessment of the agri-food industry.

To contextualize the methodological application, the study refers to documented case studies, such as the wheat-to-bread supply chain, where carbon accounting based on LCA identified emission risks, including fertilizer use at the agricultural level and energy consumption during cooking (Čapla et al., 2025). These reference cases were not replicated experimentally, but were clearly examined to demonstrate methodological robustness and practical relevance for carbon footprinting in food systems.

The study also critically assesses methodological limitations related to data availability, quality and comparability. Particular attention is paid to structural constraints in globalized and fragmented food supply chains, where changes in agricultural practices, transport methods and processing technologies prevent detailed data collection (Čapla et al., 2025). In addition, the methodological review addresses the challenges faced by SMEs, whose limited financial and technical capacity limits their ability to implement comprehensive carbon accounting systems (Čapla et al., 2025).

New technological solutions are examined as methodological aids. The study examines the role of artificial intelligence, blockchain technology and Internet of Things (IoT) sensors in improving emissions monitoring, traceability and transparency within food supply chains (Čapla et al., 2025). These technological solutions were conceptually assessed, focusing on their potential to improve agricultural production, reduce waste and support real-time environmental data collection rather than through direct experimental application.

Part of the empirical social research was based on a structured questionnaire administered to 247 respondents. The survey focused on consumer knowledge, attitudes, and self-reported behaviors related to sustainable food choices and carbon footprint labeling. Respondents were selected based on different ages, levels of education, and environmental knowledge, with a particular analytical focus on younger consumers. The questionnaire includes closed-ended and Likert-type questions, addressing shopping habits, perceptions of sustainability labels, and willingness to change consumption patterns.

Statistical analysis of survey data is conducted using descriptive and comparative methods. Frequency distributions and cross-tabulations were used to identify prevailing behavioral trends and demographic differences. The analytical framework is based on existing research linking environmental knowledge, age, and education to sustainable consumption behaviors, especially among Generation Z consumers (Kamenidou et al., 2019). In addition, insights from willingness-to-pay studies have been used as interpretive indicators to contextualize consumer responses to sustainability-labeled products (Vecchio, 2013).

Finally, the integration of environmental assessment methods with consumer survey data allows for a holistic assessment of carbon footprinting, both as a technical and behavioral tool. By combining standard carbon accounting systems with empirical insights into consumer decision making, the methodological approach supports evidence-based conclusions about the feasibility and potential effectiveness of carbon tracing in promoting climate-friendly food choices (Kamenidou et al., 2019; Vecchio, 2013).

RESULTS AND DISCUSSION

The analysis identifies several associated obstacles that significantly hinder the successful implementation of carbon footprinting in Bulgaria. The primary structural constraint is the lack of a comprehensive, standardized carbon footprinting infrastructure, which hinders accurate measurement and comparison of greenhouse gas emissions across different food products. Inconsistent production methods and fragmented supply chains lead to high variability and uncertainty in emissions data, reducing the reliability and comparability of estimated footprints (Čapla et al., 2025). This methodological limitation is a severe bottleneck for the large-scale implementation of carbon footprinting.

From a business perspective, the results indicate a significant gap in technical capacity, especially among SMEs. Many SMEs lack the knowledge and resources to implement and maintain carbon accounting systems, thereby significantly limiting their participation in carbon guidance initiatives (Čapla et al., 2025). Economic constraints further compound these limitations, as costs associated with footprint calculation, certification and label enforcement can be passed on to consumers, potentially increasing food prices and reducing market uptake, particularly in price-sensitive sectors (Vecchio, 2013).

The findings further show that SMEs face disproportionately high financial and technological barriers compared to larger companies, limiting their ability to invest in digital transformation, monitoring systems and compliance with new standards. In addition, resistance from traditional market participants – who may see carbon footprinting as costly or cumbersome, is an additional institutional barrier to widespread adoption (Pietrzyck et al., 2018). These factors together slow systemic change within the food industry.

From the consumers' perspective, the findings suggest that limited awareness of carbon footprint labels and doubts about their credibility weaken their impact on behavior. While environmental awareness is increasing, purchasing decisions are still primarily driven by price, convenience, and taste. Behavioral inertia further limits consumers' willingness to change established eating habits in the absence of strong incentives or clear, reliable information (Kamenidou et al., 2019). This highlights the vast gap between pro-environmental attitudes and actual consumption behavior.

Overall, the findings indicate that while carbon footprint labels are conceptually supported, their effectiveness is limited by methodological, economic, institutional, and behavioral barriers. Addressing these challenges requires coordinated policy interventions, targeted support for SMEs, standardization of data frameworks, and ongoing consumer education to increase trust and usage of carbon labels (Čapla et al., 2025; Kamenidou et al., 2019; Vecchio, 2013; Pietrzyck et al., 2018).

The findings suggest that climate-friendly foods are a viable way to reduce food-related greenhouse gas emissions, while maintaining nutritional value, health benefits and cultural acceptance. Diets that focus more on plant-based and sustainable foods have a significantly lower carbon footprint than diets that limit meat and dairy, without compromising diet quality (Čapla et al., 2025). In addition to their potential to reduce climate change, such foods are associated with measurable health benefits, including reduced risk of cardiovascular disease, diabetes, and some cancers, further reinforcing their value.

The study further highlights the importance of agricultural diversity as a structural component of climate-friendly diets. Evidence suggests that, in Northeast India, sustainable agricultural

systems enhance resilience, preserve agricultural productivity, and maintain ecosystem services, providing transferable insights for policymaking in the Bulgarian agricultural context. These findings highlight the role of production-side adaptation in supporting low-emission consumption patterns.

From a consumer-oriented perspective, the findings confirm that carbon footprint labelling can serve as an effective information tool, enabling transparent and comparable assessments of environmental impacts at the point of purchase (Čapla et al., 2025). When used in conjunction with broader sustainability certification schemes, carbon footprint labelling can enhance credibility and support multi-faceted sustainability claims, thereby increasing their potential impact on consumer decision-making.

However, the findings show that there is more to learn. Food consumption patterns in Bulgaria are still largely meat-based, resulting in relatively high food-related emissions. This cultural attitude is a significant obstacle to rapid dietary change. The results suggest, however, that the use of climate-friendly foods can be improved by promoting locally adapted and culturally familiar foods with low emissions. Targeted educational approaches and supportive policy instruments are important factors in facilitating dietary changes that simultaneously achieve environmental and public health goals. Overall, the results suggest that climate-friendly foods, supported by carbon footprint labelling and adaptive agricultural practices, offer significant potential for reducing emissions. On the day of their idea, Bulgaria can sit a day and go to a race, more than wishes, policy incentives and educational programs (Čapla et al., 2025; Kamenidou et al., 2019; Vecchio, 2013; Pietrzyck et al., 2018).

A comparative analysis of European experiences reveals significant differences in the success of sustainability and labelling policies, largely dependent on institutional capacity, policy consensus and socio-economic context. Germany is an example of a policy-led transformation model, where ambitious renewable energy targets and complementary energy labelling initiatives have facilitated measurable progress towards sustainability, supported by a strong technical and economic framework (Farghali et al., 2023). In parallel, circular economy measures implemented in rural areas, demonstrate integrated approaches that simultaneously reduce waste, pollution and resource inefficiency across multiple environmental domains (Mihai et al., 2021). Western European agricultural and food systems further demonstrate the benefits of a coherent market and policy framework, enabling concerted progress on sustainability objectives, trade policies, and consumer protection (Pietrzyck et al., 2018).

However, the findings also point to structural and behavioral barriers that limit the transferability of these models. The lock-in effects resulting from investments in legacy infrastructure, policy deficiencies and consumer scepticism towards branding schemes reduce their long-term effectiveness (Farghali et al., 2023). The analysis highlights that standardized policies and precise governance mechanisms are important factors in reducing misunderstandings and increasing policy effectiveness (Grubb et al., 2022). Unlike Western Europe, Bulgaria faces specific economic, cultural, and institutional constraints that require adaptation to the situation rather than direct policy imitation (Di Vita et al., 2024). The findings further suggest that regional collaboration and cross-border innovation networks can greatly facilitate technological progress and policy learning. At the same time, the development of local expertise and collaborative capacity emerges as an important factor in sustainable food system innovation (Georgia…, 2022).

A comparative analysis of European contexts reveals significant differences in the success of sustainability and branding initiatives, which largely depend on policy consensus, institutional capacity and socio-economic circumstances. Germany is a case in point, where ambitious targets to achieve 100% renewable energy by 2050, combined with an energy labelling policy, have led to visible, policy-oriented sustainability results supported by sound technical and economic analysis (Farghali et al., 2023). Additional projects on the circular economy in rural areas

further demonstrate integrated approaches that simultaneously reduce waste and environmental pollution and improve systemic efficiency in multiple environmental areas (Mihai et al., 2021). In Western Europe, the harmonization of market systems and policy frameworks in the agri-food sector provides a model for reconciling sustainability objectives with trade rules and consumer protection, leading to greater policy effectiveness and market uptake (Pietrzyck et al., 2018).

On the other hand, the findings also point to important limiting factors that reduce the impact of labelling schemes. Lock-in effects stemming from outdated infrastructure, policy weaknesses, and growing consumer skepticism significantly hinder the innovative potential of branding initiatives (Farghali et al., 2023). Evidence suggests that standardized policy and precise governance mechanisms are key factors in reducing misperceptions and improving policy effectiveness (Grubb et al., 2022). For Bulgaria, direct imitation of Western European models is neither feasible nor effective; successful adaptation requires a context that accounts for economic differences, cultural specificities, and institutional capacities (Di Vita et al., 2024). The findings further suggest that regional cooperation with neighboring countries can facilitate technology transfer and strengthen innovation networks that support sustainable food consumption and production. At the same time, the development of local expertise and collaborative capacity emerges as a determining factor for long-term sustainability success (Čapla et al., 2025; Georgia…, 2022).

The analysis of the survey results aims to explore consumers' knowledge, attitudes and behavioral intentions regarding carbon footprint food labelling and sustainable food choices. The survey, based on responses from 247 participants, provides insights into how socio-demographic characteristics, environmental awareness and information needs shape consumers' willingness to support climate-friendly food policies. The following analysis interprets each survey question individually to identify prevailing trends, levels of acceptance, and potential drivers of the adoption of carbon footprint labelling as a tool to mitigate climate change.

The survey is based on ten questions about gender of respondents, age group, size of residence, education level, defining themselves as environmentalists, willingness to change eating habits, support for EU or national carbon footprint standards, importance of climate change footprint information, willingness to use environmental information in purchasing decisions and perceived role of consumers in climate change mitigation.

The gender composition of the sample clearly shows a female predominance (Fig. 1). Women accounted for about two-thirds of the participants, while men accounted for about one-third. This gender imbalance could affect the interpretation of attitudes towards sustainability, as previous research suggests that women tend to show greater environmental awareness and stronger environmentally friendly consumption. Thus, the results may slightly overstate support for climate-friendly food policies, although they still reflect broader societal developments.

The age distribution of respondents is mainly individuals aged 36 to 65, followed by younger adults, while respondents under 25 and over 65 are underestimated. This composition suggests that the survey primarily captures the views of economically active consumers with established shopping habits. Their views are particularly relevant, as this group has a significant impact on household food consumption and market demand.

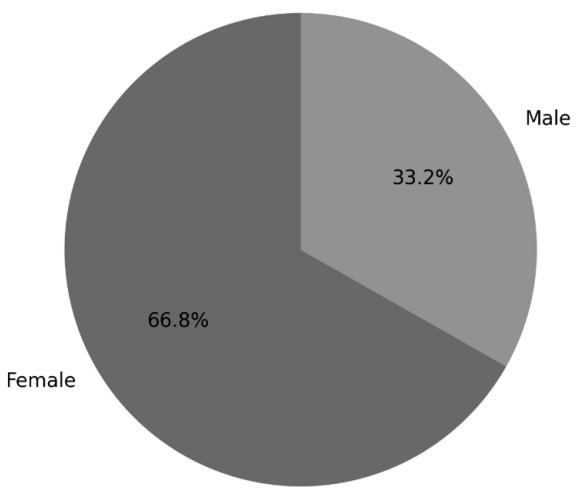

Fig. 1. Gender of respondents (n = 247)

Most respondents live in large urban areas, especially cities with more than one million inhabitants (Fig. 2). This urban dominance reflects greater access to diverse food markets, to imported and processed foods, and to more frequent engagement in sustainability discussions. Urban residence was also associated with better access to information and a higher likelihood of encountering sustainability labels, which partly explains the high level of support for eco-labels found in the survey.

The educational profile of respondents is characterized by a high proportion of individuals with a university degree (Fig. 3), followed by those with an upper secondary education. The prevalence of university education suggests a sample

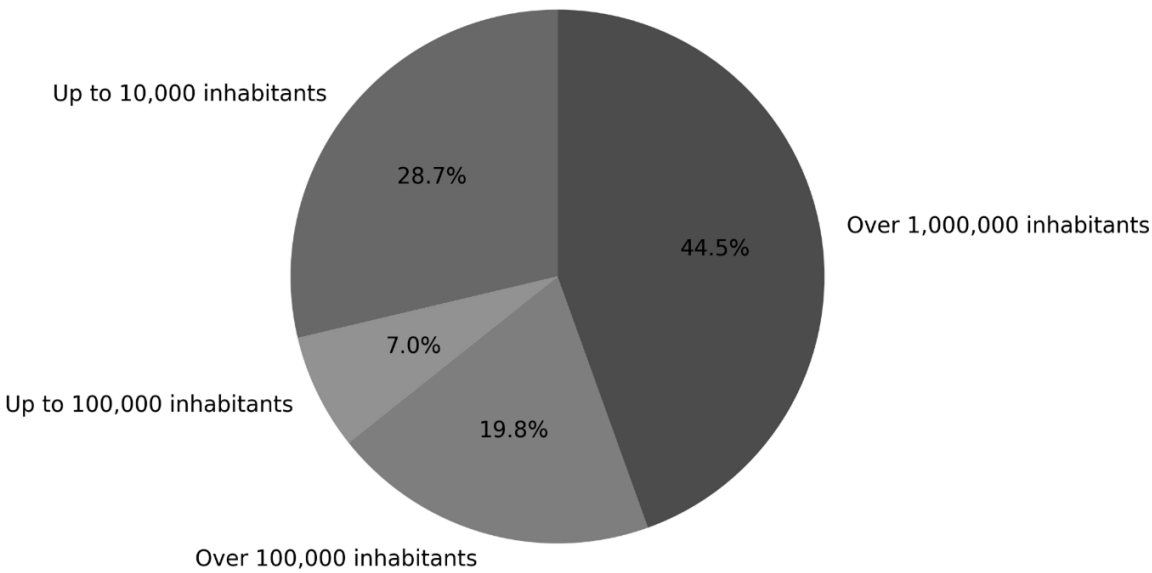

Fig. 2. Size of settlement of respondents (n = 247)

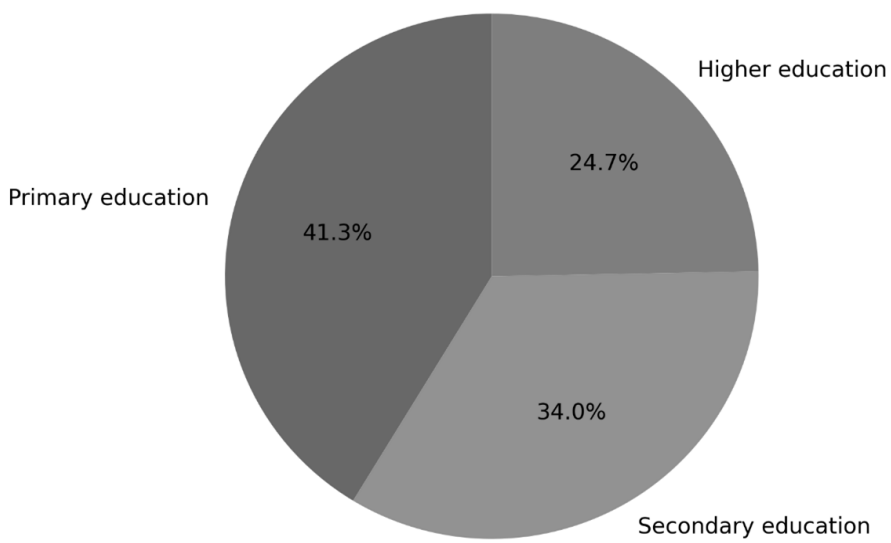

Fig. 3. Educational level of respondents (n = 247)

with relatively strong cognitive capacity to process complex information, such as environmental indicators and carbon footprint data. This factor is relevant for assessing the feasibility of carbon footprint labels as an effective communication tool for consumers.

The vast majority of respondents define themselves as environmentalists or as individuals concerned about environmental protection (Fig. 4). This identity reflects a positive behavioral background for sustainability-oriented policies. However, identity does not necessarily translate directly into a consistently pleasant environment, underscoring the importance of additional tools, such as labels, to bridge the gap between attitudes and behavior.

The majority of respondents say they are willing to change their eating habits if doing so improves environmental conditions (Fig. 5). A smaller proportion expresses uncertainty, while a limited minority rejects behavioral changes. This finding highlights a generally high level of openness towards sustainable consumption, suggesting that information interventions such as carbon footprint labels, can influence food choices when presented in an accessible and trustworthy manner.

Support for public policy requiring environmental footprint information to be displayed on food products is mainly positive (Fig. 6). Only a small proportion of respondents oppose such measures, while a moderate group remains undecided. This finding suggests a strong social legitimacy for regulatory intervention. It suggests that carbon footprint labels can be seen as a reasonable complement to consumers' current information needs.

An even higher proportion of respondents believe that it is important for consumers to know the environmental footprint of food, including traditional information such as price, origin and nutritional content. This finding reflects a shift in consumer expectations, as environmental impact increasingly becomes a key feature of food quality rather than an optional or secondary consideration. The majority of respondents indicate that they actively use environmental footprint information when making purchasing decisions. This suggests that carbon footprint labels have the potential to act not only as an awareness-raising tool, but also as a practical decision-making tool within the market. However, the presence of undefined respondents suggests that the success of such labels will depend on transparency, standardization, and trust.

The survey results show strong public support for policy measures to label food products

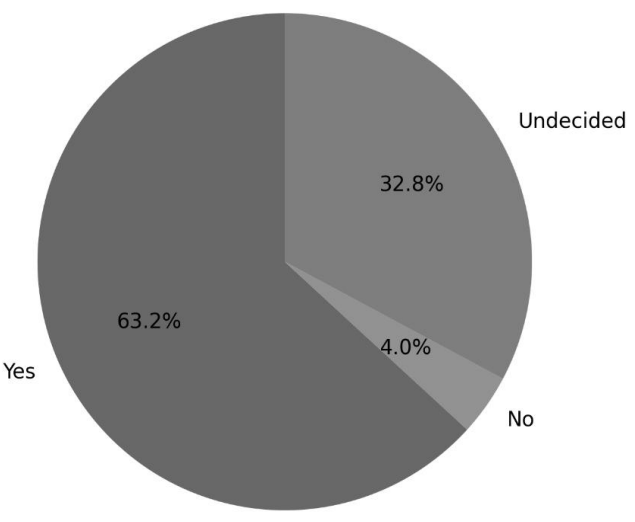

Fig. 4. Do you identify yourself as an environmentalist? (n = 247)

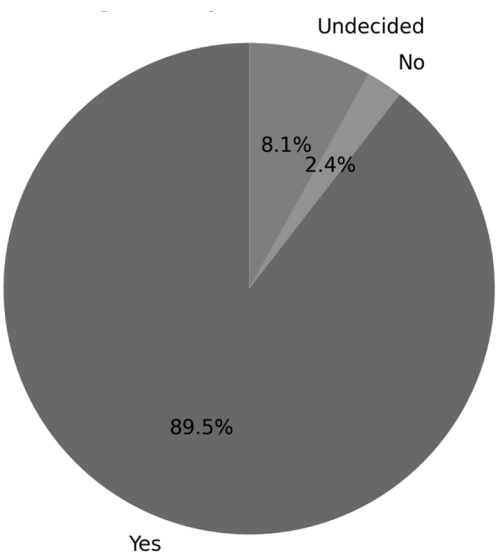

Fig. 5. Willingness to change dietary habits for better health (n = 247)

by their carbon footprint. The vast majority of respondents (78.5%) support EU or national policies requiring environmental footprint information to be displayed on food labels (Fig. 7). This finding suggests a high level of social acceptance of regulatory intervention in this area and reflects a growing recognition of the role of policy instruments in driving sustainable consumption.

At the same time, a significant proportion of respondents (16.2%) remain undecided, suggesting that while there is broad support, and some consumers may need more information or more transparent communication about the objectives, methodology and implications of such a labelling policy. Only a small minority (5.3%) express their opposition, highlighting that opposition to carbon footprinting is relatively limited within the survey group.

Overall, these findings suggest a favorable policy environment for the introduction of mandatory or semi-mandatory carbon footprinting schemes. The high level of support suggests that consumers are willing to accept environmental information as a standard element of food labels, alongside information on price, origin and nutritional value. This finding strengthens the argument that carbon footprinting can be a legitimate and effective tool for aligning consumer behavior with climate change mitigation objectives, provided it is implemented transparently, in a standardized manner, and in a way that is easily interpretable.

Most respondents recognize consumers as important actors in addressing climate change through their daily food choices (Fig. 8). This understanding is consistent with contemporary sustainability discourse, which emphasizes shared responsibility between manufacturers, politicians, and consumers. The result validates the study's conceptual basis. It supports the hypothesis that consumer-oriented tools such as carbon footprint labelling, can make a significant contribution to climate change mitigation.

Survey results generally indicate a strong alignment between consumer attitudes and the goals of climate-friendly food policies. High environmental awareness, widespread support for the policy and a stated willingness to change food consumption behavior suggest a favorable social context for the implementation of carbon footprint labelling. At the same time, the presence of undetermined respondents underscores the continued importance of clear communication, standardized methodologies, and consumer education. Taken together, the results confirm that carbon footprint scoring has the potential to act

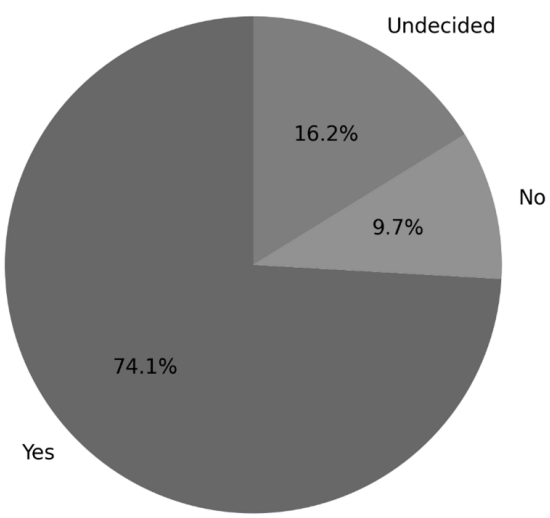

Fig. 6. Willingness to change dietary habits for environmental improvement (n = 247)

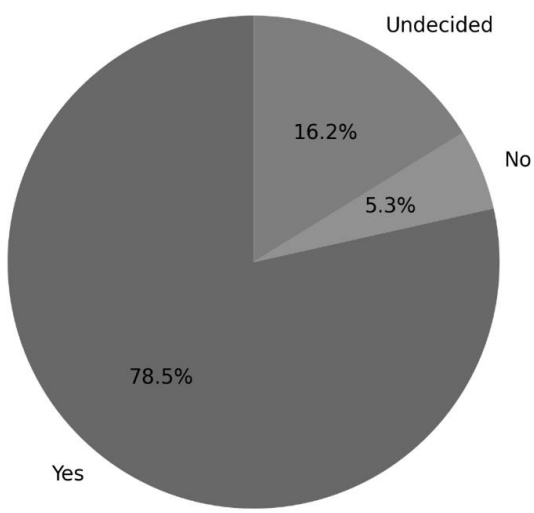

Fig. 7. Support for EU or national policy on carbon footprint labelling (n = 247)

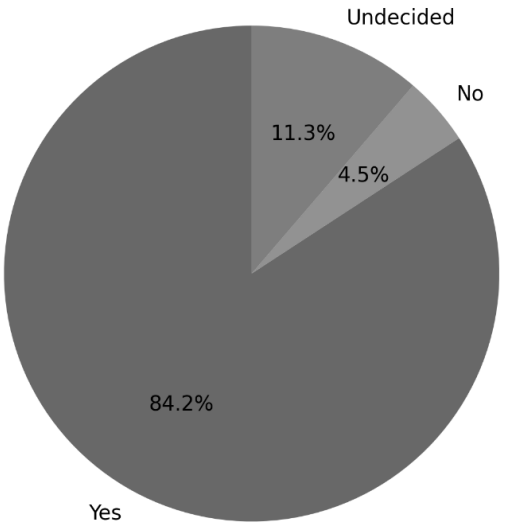

Fig. 8. Importance of knowing the environmental footprint of food products (n = 247)

as an effective link between climate policy and everyday consumer decision-making, especially in societies undergoing rapid socio-economic and cultural changes.

CONCLUSIONS

This study shows that carbon footprinting is a scientifically grounded and socially supported tool for addressing greenhouse gas emissions from food in Bulgaria. By combining internationally accepted carbon accounting methods with empirical research, the study confirms that food systems contribute significantly to climate change and that consumer-oriented information tools can play an important role in mitigation. The results provide scientific evidence that a climate-friendly diet characterized by lower emission food choices, simultaneously delivers environmental, health and sustainability benefits, reinforcing the importance of consumer-side interventions within the climate policy framework.

From a practical perspective, the results highlight both opportunities and barriers for implementing carbon footprinting. High consumer awareness, willingness to change diets and support for policy interventions suggest a favorable societal context for the implementation of such labels. At the same time, considerable barriers remain, including limited data, financial and technical barriers to SMEs, and the gap between environmentally friendly behaviors and actual consumer behavior. These findings highlight the need for coordinated policy actions, standardized methodologies, targeted support for businesses, and ongoing consumer education to ensure the credibility and effectiveness of carbon labelling schemes.

Finally, the study confirms that carbon footprint labelling, if part of a broader policy promoting climate-friendly foods and sustainable agriculture, would significantly contribute to Bulgaria's climate and sustainability goals. The practical implications go beyond food labelling and point to the need for multidisciplinary collaboration among policymakers, business stakeholders, and civil society. By aligning scientific evidence with culturally and institutionally appropriate policy interventions, the carbon footprint can become a key component of the long-term transition toward a low-carbon, resilient, and healthy food system. 11 funding.

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