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frontiers | Frontiers in Sustainable Food Systems

TYPE Original Research
PUBLISHED 20 February 2026
DOI 10.3389/fsufs.2026.1622234

OPEN ACCESS

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RECEIVED 02 May 2025
REVISED 12 January 2026
ACCEPTED 15 January 2026
PUBLISHED 20 February 2026

CITATION
Cheikh Ismail L, Kassem H, Hashim M, Hasan H, Osaili TM, Mohamad MN, Zeb F, Al Daour R, Stojanovska L and Al Dhaheri AS (2026) Perceptions and willingness to reduce meat consumption among consumers in the United Arab Emirates: a cross-sectional analysis. *Front. Sustain. Food Syst.* 10:1622234. doi: 10.3389/fsufs.2026.1622234

Perceptions and willingness to reduce meat consumption among consumers in the United Arab Emirates: a cross-sectional analysis

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Background: Growing global concern over the health and environmental impacts of meat consumption has intensified interest in sustainable dietary practices. Understanding consumer attitudes and behaviors around meat reduction is essential to inform effective public health strategies. This study explored consumer perceptions, behaviors, and awareness related to meat consumption and sustainable diets in the United Arab Emirates (UAE).

Methods: A cross-sectional web-based survey was conducted among 1,371 adults across all seven emirates. The questionnaire assessed meat consumption frequency, awareness of sustainability, willingness to reduce meat intake, and preferences for meat alternatives. Descriptive and inferential analyses were used to identify key patterns and associations.

Results: Participants reported frequent red-meat consumption, with a median of 1 eating occasions per week (IQR 0.5–3) for unprocessed red meat and 0.5 eating occasions per week (IQR 0.5–1) for processed red meat. Eggs, dairy, and fish were the most frequently consumed alternatives, while plant-based options were less commonly used. Only 7% expressed strong willingness to reduce meat intake, with health concerns (49.4%) being the most common motivation. Environmental (17.4%) and animal welfare (10.7%) concerns were less frequently reported. Cultural norms (44.2%) and taste preferences (33.5%) were leading barriers. Sustainability was rated as very important by only 12.2%. No significant associations were found between willingness to reduce meat intake and demographic or health-related characteristics ($p > 0.05$).

Conclusion: Findings underscore the limited readiness among UAE consumers to reduce meat consumption, despite moderate awareness of sustainability. Targeted, culturally tailored interventions are needed to address barriers and promote plant-based dietary habits that support both public health and environmental goals.

KEYWORDS

consumer behaviour, cultural influences, meat consumption, plant-based alternatives, sustainable diets

1 Introduction

Globally, food production systems are among the leading contributors to environmental degradation (Halpern et al., 2022). Recent estimates attribute ~34% of total anthropogenic greenhouse gas emissions to the global food system (Crippa et al., 2021), with substantial impacts on biodiversity, land, and water use (Poore and Nemecek, 2018). These estimates are consistent with recent global syntheses that quantify food-system emissions across supply-chain stages (Crippa et al., 2021; Tubiello et al., 2022). This growing concern has created an urgent need to change the way society consumes and produces food. Concurrently, reducing red and processed meat consumption has been linked to improved health outcomes, including lower risks of obesity, cardiovascular disease, and certain cancers (Farvid et al., 2021). The relationship between food choices and their impact on the environment has captured the attention of scientists, policymakers, and environmental advocates. In response, many countries have updated food-based dietary guidelines (FBDGs) to integrate sustainability and recommend lower intakes of red and processed meats, emphasizing largely plant-forward patterns (Klapp et al., 2022; James-Martin et al., 2022). Examples include Australia, the Netherlands, the Nordic Council, Norway, Portugal, Saudi Arabia, among others. Despite these efforts, strictly vegetarian, vegan and pescatarian diets remain minority patterns in most populations, with national surveys typically reporting low single-digit prevalences for each (1%–7%) (Wozniak et al., 2020; Bakaloudi et al., 2021; Wesseldijk et al., 2023). Recent findings in Saudi Arabia indicate a similar trend, with veganism reported at 4.7% and vegetarianism at 7.8% (AL-Mohaithef, 2022).

Many scientific insights highlight the serious damage animal production poses to essential resources such as land, water, and energy (Godfray et al., 2018). Recent estimates indicate that animal-based foods generate roughly twice the greenhouse-gas emissions of plant-based foods (57% vs. 29% of ~17.3 Gt CO_2-eq) (Xu et al., 2021). Not only in terms of greenhouse-gas emissions but, plant-based dietary patterns consistently show lower land use and biodiversity loss than standard diets and are linked to better health outcomes (Carey et al., 2023).

According to FAOSTAT's latest Food Balance Sheets, the UAE's per-capita meat supply in 2022 was just over 60 kg/person/year, with poultry the main driver of recent growth; given that the UAE imports roughly 85–90% of its food and domestic livestock output remains small (e.g., poultry production ~56,000 MT in 2022), most environmental impacts arise along import-dominated supply chains rather than local primary production (FAOSTAT, 2024). This high meat demand in the UAE, exceeded the 2022 global average of about 44–45 kg per person per year (FAOSTAT, 2024). Several interacting factors underlie the UAE's rising meat consumption. These include the country's prosperity and greater purchasing power, followed by an increase in consumption of resource-intensive foods such as meat. Furthermore, because of the UAE's cultural tradition steeped in rich culinary heritage, meat-related dishes take precedence as a staple in the diet (Cheikh Ismail et al., 2023).

Sustainable diets emphasize a shift toward more plant-based foods and a reduced consumption of animal-based products, particularly red and processed meats (Meybeck and Gitz, 2017). This approach aligns with research highlighted by the EAT-Lancet Commission, emphasizing the importance of plant-based diets for both human health and environmental sustainability (Rockström et al., 2025). While sustainable agricultural practices are continually improving, reducing meat consumption remains a crucial factor in promoting sustainable diets. Evidence consistently demonstrates that decreasing meat intake plays a significant role in lessening the environmental impact of food production (Aleksandrowicz et al., 2016; Springmann et al., 2016).

Individuals play a pivotal role in reducing their ecological footprint and contributing to a more sustainable global food system by transitioning to plant-based alternatives and moderating meat consumption. This shift toward sustainable diets not only offers promising prospects for environmental conservation but also holds the potential for improved health outcomes (Satija et al., 2016). Bahn et al. (2019) assessed the environmental and nutritional impacts of current and recommended dietary patterns across 17 Middle East and North Africa (MENA) countries (Bahn et al., 2019). Their analysis revealed that reducing red meat consumption significantly lowers environmental footprints, whereas increasing the intake of vegetables, legumes, nuts, and fruits results in higher resource use (Bahn et al., 2019). To balance sustainability and nutrition, the study supports replacing animal proteins (meat, eggs, fish, and dairy) with alternative sources such as plant-based proteins, microalgae, edible insects, and cultured meat.

Understanding the motivations and barriers that individuals face in reducing meat consumption and integrating more plant-based sources into their diets is crucial for the development of effective interventions and policies. Evidence from behavioral and socio-economic studies (Fernqvist et al., 2024; Alcorta et al., 2021) shows that intentions and attitudes, social norms, habits/identity, taste expectations, price, convenience, and labeling drive adoption of plant-forward diets, whereas neophobia, perceived cost, limited availability, and nutrition concerns impede it; effective strategies pair targeted education and norm based messaging with structural measures, improved affordability and access, better sensory quality (including reformulation and fortification), and clear labeling, tailored to groups most ready to shift (Fernqvist et al., 2024; Alcorta et al., 2021).

Recent research in the UAE indicated that while approximately 51.2% of Emiratis are familiar with alternative proteins, a significant majority (74%) prefer plant-based options (Maqsood et al., 2025). However, factors such as sensory attributes, availability, and cultural significance influence their willingness to adopt these alternatives (Maqsood et al., 2025). Therefore, this study aims to examine meat consumption patterns among consumers in the UAE and their perceptions of reducing meat consumption, explore meat alternative preferences, and investigate

motivations and barriers to reducing meat consumption among adult consumers.

2 Materials and methods

2.1 Study design and participants

This cross-sectional, web-based study was conducted between February and September 2023, targeting adult consumers in the United Arab Emirates (UAE). This period included Ramadan (late March to late April 2023), however, the questionnaire asked respondents to report their usual meat consumption over the preceding few months, rather than focusing exclusively on Ramadan-specific meals, and recruitment occurred across pre-, during-, and post-Ramadan weeks.

Eligible participants included UAE nationals and expatriates aged 18 years and older who were residing in the country at the time of the study. A total of 1,371 participants were recruited from all seven emirates -Abu Dhabi, Dubai, Sharjah, and the Northern Emirates (Ajman, Umm Al Quwain, Ras Al Khaimah, and Fujairah)—using a convenience sampling approach.

The study was disseminated via a web link to an online survey, which was shared across multiple social media platforms, including LinkedIn™, Facebook™, and Instagram™. Additional recruitment was conducted through email and WhatsApp™ invitations sent via the researchers' networks. These platforms were selected because they are among the most used communication channels among adults in the UAE, support dissemination of bilingual (Arabic and English) content, and facilitate rapid, low-cost recruitment across diverse socio-demographic groups. To maximize participation, a snowball sampling technique was employed, where consenting participants were encouraged to share the survey link within their networks.

Before participation, individuals were presented with an information sheet detailing the study's objectives, significance, and protocol. This was followed by an electronic consent form, which was required to proceed with the questionnaire. Ethical approval for the study was granted by the Research Ethics Committee at the University of Sharjah (Approval Number: REC-23-09-14-02-S). Informed consent was obtained electronically from all participants before data collection.

2.2 Questionnaire development and structure

The survey questionnaire was designed using Google Forms and was made available in both English and Arabic to ensure accessibility. A panel of three experts in clinical nutrition and dietetics reviewed the questionnaire for content validity. The revised questionnaire was pilot-tested with 30 participants to assess item clarity and relevance. Internal consistency was measured with Cronbach's alpha (α), showing strong overall reliability with an alpha value of 0.84. Data from the pilot test were excluded from the final analysis. The questionnaire was translated from English to Arabic using the Brislin back-translation method to maintain linguistic and conceptual equivalence.

The questionnaire consisted of 25 close-ended questions structured into key sections (Table 1). The first section collected sociodemographic data, including gender, nationality, age group, marital status, employment status, household income, and education level. Self-reported height and weight were also recorded to calculate body mass index (BMI) by dividing the weight in kilograms by the height squared in meters (kg/m^2). Then it was classified according to the World Health Organization (WHO) 1998 classifications: underweight (BMI less than 18.5 kg/m^2), normal (BMI 18.5 to 24.9 kg/m^2), overweight (BMI 25 to 29.9 kg/m^2), and obese (BMI equal to or greater than 30 kg/m^2).

The second section assessed meat consumption patterns, focusing on the frequency and quantity of red meat, poultry, seafood, and processed meats consumed, as well as plant-based alternatives, with comparisons to dietary habits from 3 years prior. For the main outcome analyses, 'meat consumption' referred specifically to red meat (unprocessed and processed). The third section explored dietary habits and preferences, examining participants' eating patterns when avoiding meat, their frequency of plant-based meal consumption, and experience with vegetarian meat substitutes. The fourth section evaluated perceptions of meat reduction, including motivations such as health, cost, environmental concerns, and animal welfare, along with challenges associated with reducing meat intake. The fifth section measured awareness of sustainability and health impacts, assessing familiarity with sustainable diets, willingness to reduce meat consumption, and perceived barriers to adopting a more plant-based diet. Lastly, the sixth section explored environmental and societal

TABLE 1 Structure and key components of the survey on meat consumption and sustainable diets in the UAE.

Activity	Description
Introduction	Overview of the survey, objectives, and consent process.
Socio-demographic characteristics of participants	Information on gender, nationality, age, marital status, employment status, household income, and education level. Self-reported height and weight were collected for BMI calculation.
Meat consumption patterns	Frequency and quantity of different meat types consumed in the past few months, including red meat, poultry, seafood, processed meats, and plant-based alternatives. Comparison of current meat consumption to intake 3 years ago.
Dietary habits and preferences	Eating patterns when avoiding meat, frequency of plant-based meal consumption, and experience with vegetarian meat substitutes.
Perceptions of meat reduction	Motivations for reducing meat intake (e.g., health, cost, environment, animal welfare) and reasons for maintaining meat consumption.
Awareness of sustainability and health impacts	Familiarity with sustainable diets, willingness to reduce meat consumption, and perceived challenges to adopting a more plant-based diet.
Environmental and societal perspectives	Perceptions of the environmental impact of meat consumption, opinions on sustainability in food choices, and knowledge of alternative protein sources.

perspectives, investigating participants' views on the environmental impact of meat consumption, attitudes toward sustainability in food choices, and knowledge of alternative protein sources.

The questionnaire items in the results section are grouped thematically (sociodemographic characteristics, meat consumption patterns, meat-free meals and plant-based alternatives, perceptions and barriers, and environmental and sustainability awareness) rather than strictly following the chronological order of the administered questionnaire; the full instrument as administered is provided in Supplementary file S1.

In this study, 'meat consumption' refers primarily to the intake of terrestrial animal flesh, with a focus on red meat (beef, lamb, goat) and processed red-meat products (sausages, luncheon meats, cold cuts). Poultry and seafood were assessed as separate protein categories, and cultured meat was not included in the consumption measures because it was not yet widely available in the UAE during data collection. 'Perceptions' denotes participants' beliefs, attitudes, and perceived benefits or risks related to meat consumption and its reduction, while 'willingness' reflects their self-reported intention to reduce red-meat intake as captured by a 5-point Likert-scale item.

2.3 Open-text coding

For items that included an 'Other (please specify)' option, free-text responses were analysed using an inductive content-analysis approach. Two researchers independently reviewed all responses, generated preliminary codes, and then grouped these into broader themes.

For the item on factors influencing meat consumption (Table 2), free-text responses such as "I do not like meat," "I do not like," "I'm not a fan of meat," "I do not prefer it," "I do not like to eat protein," and "It does not taste that good" were all interpreted as reflecting a general personal dislike or low preference for meat/protein and were therefore coded under the theme "I do not like the taste of meat." A single response referring to family/partner decision-making ("It's my wife's decision") was coded as a separate theme indicating that meat consumption was determined by a spouse rather than personal attitude; however, this theme was not presented in the table due to its low frequency.

For the question shown in Figure 1 ("How do you think that reducing meat consumption can help address environmental challenges such as climate change and resource depletion?"), repeated responses such as "I do not think it impacts the environment," "No impact," "No," and "Not really" were grouped into the theme "I do not think it impacts the environment." Two additional themes "Reduce cost" and "For the world" each occurred only once and were therefore not presented in the figure due to low frequency.

TABLE 2 Motivations for reducing red-meat consumption among participants (*N* = 1,371).

Factors	*N* (%)
Health effects of meat consumption	677 (49.4)
I do not want to reduce my meat consumption	391 (28.5)
The cost of meat	244 (17.8)
Environmental impacts of meat production	238 (17.4)
Animal welfare issues involved with meat products	147 (10.7)
I do not like the taste of meat (*coded from "Other reason"*)	34 (2.5)

Multiple responses permitted.

2.4 Statistical analysis

Data analysis was conducted using SPSS version 29.0 (IBM, Chicago, IL, USA). Descriptive statistics were used to summarize socio-demographic characteristics, dietary habits, and attitudes toward meat consumption, with categorical variables presented as frequencies and percentages and continuous variables reported as medians and interquartile ranges (IQR). Consumption frequency responses from the FFQ were mapped to weekly servings and collapsed into five levels (0.5, 1, 3, 5.5, and 7 times/week). 'Never or less than once/month' and '1–3 times/month' were combined and coded as 0.5 times/week (representing ≤0.5 times/week), '1 time/week' as 1 time/week, '2–4 times/week' as 3 times/week, and '5–6 times/week' as 5.5 times/week. All categories of once/day or more (once/day, 2–3 times/day, 4–5 times or more/day, and ≥6 times/day) were collapsed and coded as 7 times/week (representing ≥7 times/week). Medians (IQR) were calculated from the continuous mapped variable, with identical handling for unprocessed and processed items. For perception/attitude items, Likert responses (1 = Strongly disagree to 5 = Strongly agree) were scored and averaged; items were ranked by mean score to identify the most salient barriers. Chi-square tests were performed to examine associations between socio-demographic factors (e.g., gender, nationality, education level) and meat consumption behaviors. Differences in willingness to reduce meat consumption were assessed across demographic groups. Results were significant at p-value < 0.05.

3 Results

3.1 Sociodemographic characteristics and nutritional status of the participants

As shown in Table 3, participants were predominantly women (65.4%) with a median age of 32 years ($Q1$ = 23 years and $Q3$ = 42 years). Most were Arab (GCC 45.8%, non-GCC 48.1%) and distributed across emirates (Sharjah 34.1%, Dubai 23.5%, Abu Dhabi 20.8%, Northern Emirates 21.6%). Half were married, 62.9% held a university degree or higher, 56.0% were employed, and 35.5% reported a medical condition; BMI categories were 40.2% normal weight, 36.5% overweight, and 19.6% obese.

3.2 Consumption pattern and frequency of red meat

As shown in Table 4, unprocessed red meat was typically consumed 1 time/week (median 1.0, IQR 0.5–3), with the modal category 3 times/week (36.7%); about half of participants (50.8%) reported low consumption (≤1 time/week). Processed red meat intake was lower, with a median of 0.5 times/week (IQR 0.5–1), and around two-thirds

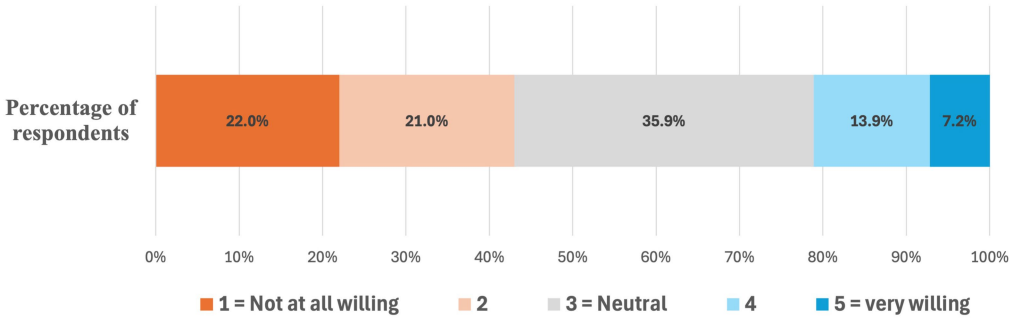

FIGURE 1
Environmental awareness, perceptions, and experience with plant-based meals among participants. **(A)** Consideration of the environmental impact of food choices (*N* = 1,371); **(B)** perceived environmental benefits of reducing meat consumption (multi-select; *n* = 302); **(C)** prior trial of plant-based meals or vegetarian meat substitutes (*N* = 1,371); **(D)** liking of plant-based meals among those who had tried them (*n* = 712).

(69.4%) reporting 0.5 time/week; in total, 82.8% consumed processed red meat ≤1 time/week. Daily consumption (7 times/week) was uncommon for both unprocessed (4.2%) and processed (3.4%) red meat.

3.3 Dietary habits and preferences

As shown in Table 5, when opting for a meat-free meal participants most commonly chose eggs (54.0%) and cheese/dairy (51.9%), followed by fish (45.9%), grains (32.1%), nuts (29.6%), and beans (24.9%); imitation meats (8.0%) and tofu (3.7%) were infrequently selected. Plant-based meals were consumed a few times per week by 41.9%, a few times per month by 25.9%, never/rarely by 19.7%, and daily by 12.5%.

3.4 Perceptions of meat reduction

Figure 2 illustrates participants' willingness to reduce their meat consumption, based on a five-point scale. Overall, 43% reported low willingness (1–2), 35.9% were neutral (3), and 21.1% reported high willingness (4–5) to reduce meat consumption.

Table 2 outlines the key factors influencing participants' meat consumption choices. Health concerns were the most cited factor, with 49.4% of participants acknowledging the health effects of meat consumption, while 50.6% did not consider it a concern. Other factors had a notably lower influence. Only 17.4% of participants considered the environmental impact of meat production, while 17.8% were influenced by cost considerations. Concerns about animal welfare were reported by 10.7% of respondents. Taste preference was a minimal factor, with only 2.5% of participants indicating a dislike for the taste of meat. Additionally, 28.5% explicitly stated that they did not want to reduce their meat consumption.

As shown in Table 6, respondents most strongly agreed the view that meat is important for a balanced diet (56.5% agree/strongly agree; mean = 3.78 ± 1.25). Potential barriers to meatless eating were less definitive: difficulty preparing meatless meals (26.2% agree; mean = 2.89), unappealing taste/texture (25.4%; mean = 2.90), higher cost of meatless options (28.0%; mean = 3.05), and limited availability of plant-based alternatives (33.2%; mean = 3.15) drew mixed opinions with sizable neutral responses (≈31–37% across items). Cultural and habit cues were also split; meat as part of culture (35.3% agree; mean = 3.17) and meal is not complete without meat (31.2%; mean = 3.04). Only a minority reported disliking vegetables (17.1% agree; mean = 2.47).

3.5 Awareness and attitudes toward sustainable diets and meat consumption about health and environmental concerns

Table 7 shows that most respondents reported at least some familiarity with the concept of a sustainable diet (75.2% across somewhat, moderately, and very familiar), and 68.3% believed it is possible to follow a healthy diet without meat (21.7% no, 10.0% not sure). The leading perceived challenges to reducing meat consumption were cultural or social norms (44.1%) and taste or familiarity with plant-based foods (33.5%), with cost and accessibility cited less often (20.7%). Sustainability factored into food choice for a majority, although most rated it as somewhat important (46.0%) rather than very important (12.2%), while 28.6% considered it not very important and 13.3% not at all important.

Figure 1 summarizes participants' environmental awareness, perceived benefits of meat reduction, and experience with plant-based meals. (2A) Nearly half reported considering the environmental impact of their food choices (47.3%). (2B) Among respondents who articulated specific benefits (*n* = 302), reductions in deforestation and land use were most frequently reported (59.9%), followed by water conservation (45.0%) and lower greenhouse-gas emissions (38.1%). (2C) Just over half had tried a plant-based meal or vegetarian meat substitute (51.9%). (2D) Among respondents who had tried a plant-based meal and provided a rating (*n* = 712), evaluations were skewed toward low liking: 32.7% selected 1 (did not like at all) and 27.9% selected 2; while only 7.3% chose 5 (liked very much).

3.6 Predictors of willingness to reduce red meat consumption

Table 8 presents the relationship between participants' socio-demographic and health characteristics and their reported willingness to reduce meat consumption. The analysis showed no statistically

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TABLE 3 Sociodemographic characteristics and nutritional status of the participants (n = 1,371).

Variables	Median/*N*	Percentage
Age (Years)*	32.00 (19)	
Sex		
Male	474	34.6%
Female	897	65.4%
Emirate		
Abu Dhabi	285	20.8%
Dubai	322	23.5%
Sharjah	468	34.1%
Northern Emirates	296	21.6%
Nationality		
GCC countries	628	45.8%
Non-GCC Arab	660	48.1%
Non-Arab	83	6.1%
Marital status		
Single	604	44.1%
Married	696	50.8%
Divorced/widowed	71	5.2%
Education level		
Less than high school	30	2.2%
High school	259	18.9%
College/diploma	219	16%
University degree	679	49.5%
Higher education	184	13.4%
Employment		
Employed	768	56%
Unemployed	349	25.5%
Student	254	18.5%
Monthly household income (AED)		
<5,000	145	10.6%
5,000 to <10,000	296	21.6%
10,000 to <20,000	360	26.3%
20,000 to <30,000	288	21%
30,000 and above	282	20.6%
Medical condition (Yes/No)		
No	884	64.5%
Yes	487	35.5%
Body mass index (kg/m^2)		
Underweight (<18.5)	51	3.7%
Normal (18.5–24.9)	551	40.2%
Overweight (25–29.9)	500	36.5%
Obese (above or = 30)	269	19.6%

*Median (IQR).

TABLE 4 Consumption pattern and frequency of red meat.

Variables	Average consumption/ week Median (IQR)	Times/week				
		0.5 *N* (%)	1 *N* (%)	3 *N* (%)	5.5 *N* (%)	7 *N* (%)
Red meat						
Unprocessed	1.0 (0.5–3)	396 (28.9)	300 (21.9)	503 (36.7)	114 (8.3)	58 (4.2)
Processed	0.5 (0.5–1)	0.951 (69.4)	184 (13.4)	147 (10.7)	43 (3.1)	46 (3.4)

*Median (IQR).

TABLE 5 Intake of meat alternatives and frequency of plant-based meals.

Response option	*N* (%)
What do you eat when you want a meal without meat?*	
Eggs	741 (54.0)
Cheese and Dairy	711 (51.9)
Fish	629 (45.9)
Grains	440 (32.1)
Nuts	406 (29.6)
Beans	341 (24.9)
Imitation meat	110 (8.0)
Tofu	51 (3.7)
How often do you eat plant-based meals?	
Never/rarely	270(19.7)
A few times per month	355(25.9)
A few times per week	574(41.9)
Daily	172(12.5)

*Multiple responses permitted.

significant differences across any of the examined variables, including sex, age group, emirate of residence, nationality, marital status, number of children, education level, employment status, household income, medical condition, and BMI category (all $p > 0.05$). This suggests that willingness to reduce meat intake was relatively consistent across population subgroups in the sample.

4 Discussion

This study highlights higher consumption of unprocessed than processed red meat, with over half of participants eating it no more than once per week. While eggs, dairy products, and fish emerged as the most frequently used meat alternatives, the integration of plant-based meals into daily dietary routines remained limited. Although a segment of respondents expressed willingness to reducing their meat intake, overall willingness was low. Health considerations were the most cited factor influencing meat consumption, whereas environmental concerns and cost were less frequently acknowledged. Importantly, participants identified cultural norms, taste preferences, meal preparation difficulties, and limited availability of plant-based options as key barriers to dietary change.

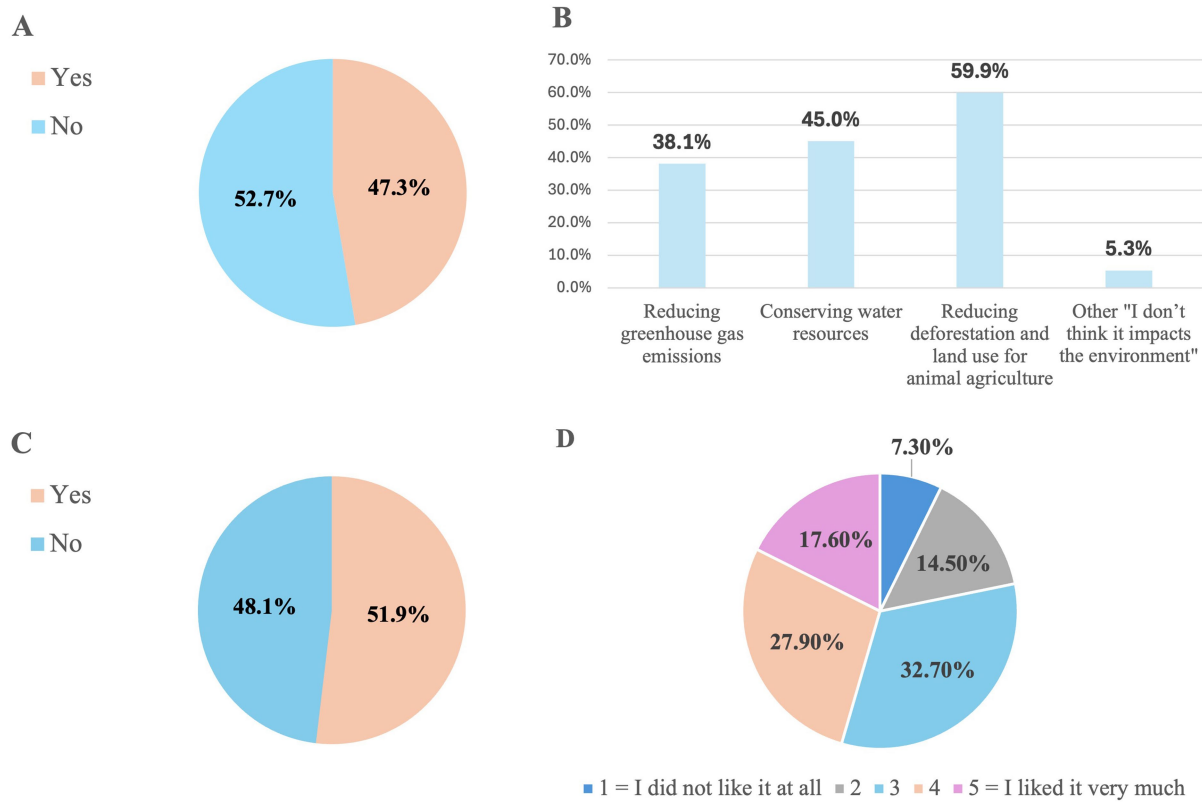

FIGURE 2
Distribution of willingness to reduce meat consumption on a 5-point Likert scale (1 = not at all willing, 5 = very willing) among adults in the UAE (*N* = 1,371).

Red-meat intake in this study was frequent for both unprocessed and processed products, with fresh cuts forming the routine choice and processed items also appearing regularly. In the regional context these processed meats are mostly Halal formats such as luncheon meats, sausages, and cold cuts. This pattern aligns with findings from Khaleel et al. (2025). They reported that consumers in the UAE where meat eating was near universal with about 86% consumed red meat, poultry, and seafood and only 4% identified as pescatarian, vegetarian, or vegan, with meat present in most lunches and dinners (~90 and 60%, respectively). This highlights the need for culturally compatible, halal-compliant alternatives and practical meal guidance to support gradual reductions in red and processed meat without compromising dietary traditions.

Research points to a preference for classic protein sources like dairy and eggs over plant-based options. For example, a study by Cheikh Ismail et al. (2023) found a low consumption of plant-based foods and a greater liking for animal-based proteins among adults in the UAE (Cheikh Ismail et al., 2023). The present study findings align with recent trends observed in the UAE concerning dietary shifts, particularly the growing interest in reducing meat consumption in favour of plant-based alternatives (Maqsood et al., 2025). Studies report a significant increase in demand for plant-based products in the UAE, driven by a combination of health consciousness, environmental concerns, and the influence of global dietary trends (Maqsood et al., 2025; Khaleel et al., 2025). The UAE's market for meat substitutes has shown substantial growth, with predictions that this trend will continue to expand rapidly over the coming years (Research GV, n.d.). The UAE's designation of 2023 as the 'Year of Sustainability' helped raise the profile of environmentally friendly food choices through national campaigns, public-sector procurement initiatives, and collaborations with local retailers and restaurants to promote plant-forward options (Affairs UMoF, 2023). Interestingly, 47% of participants in this study reported being aware of the environmental impact of their food choices, suggesting a moderate level of consciousness regarding the ecological consequences of meat consumption. This aligns with findings from a comparative study conducted in Canada and Kuwait, which identified environmental concern and attachment to meat as key factors influencing consumer attitudes toward plant-based meat alternatives (Bakr et al., 2023).

Our findings mirror prior UAE research showing that growing health concerns are the primary driver of dietary change, whereas environmental considerations and cost are less influential (Maqsood et al., 2025; Khaleel et al., 2025). Consistent with qualitative work in the UAE, religious dietary laws and cultural traditions remain powerful determinants of meat consumption, yet younger, more educated respondents demonstrate greater environmental awareness and willingness to reduce meat (Contu, 2025). This highlights the value of culturally sensitive, religion-aligned public health campaigns.

Many people are becoming more aware of the health and environmental advantages of cutting back on meat consumption, but many still resist altering their dietary habits (Kwasny et al., 2022). Graça et al. (2015), discovered that psychological resistance, such as the pleasure of consuming meat and its cultural importance, has a

TABLE 6 Perceived barriers and attitudes toward reducing meat consumption* (Likert-scale items, *N* = 1,371).

Item	Strongly disagree *N* (%)	Disagree *N* (%)	Neither *N* (%)	Agree *N* (%)	Strongly agree *N* (%)	Mean (SD)
I find it difficult to prepare meatless meals	226 (16.5)	344 (25.1)	442 (32.2)	67 (4.9)	292 (21.3)	2.89 (1.34)
I find the taste and texture of meatless meals unappetizing	174 (12.7)	418 (30.5)	430 (31.4)	69 (5.0)	280 (20.4)	2.90 (1.29)
Meatless meals and vegetarian options are more expensive than meat-based meals	137 (10.0)	346 (25.2)	504 (36.8)	77 (5.6)	307 (22.4)	3.05 (1.27)
Meat is important for a balanced and healthy diet	66 (4.8)	164 (12.0)	367 (26.8)	182 (13.3)	592 (43.2)	3.78 (1.25)
I find meatless meals boring and lacking flavour/variety	133 (9.7)	353 (25.7)	449 (32.7)	89 (6.5)	347 (25.3)	3.12 (1.31)
I do not like to eat vegetables	355 (25.9)	440 (32.1)	341 (24.9)	44 (3.2)	191 (13.9)	2.47 (1.29)
I feel that my meal is not complete without meat	166 (12.1)	389 (28.4)	388 (28.3)	85 (6.2)	343 (25.0)	3.04 (1.35)
Meat is part of my culture that I do not want to give up	162 (11.8)	303 (22.1)	422 (30.8)	104 (7.6)	380 (27.7)	3.17 (1.36)
Meat is readily available in the market and restaurants, while plant-based alternatives are harder to find	151 (11.0)	297 (21.7)	467 (34.1)	102 (7.4)	354 (25.8)	3.15 (1.32)

Responses rated on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree). Means (SD) are computed on this 1–5 scale; higher values indicate greater agreement with the item as worded. Percentages are row percentages and may not sum to 100 due to rounding.

significant impact on this hesitation (Graça et al., 2015). de Venter Villiers et al. (2024) study also pointed out that consumers face difficulties in transitioning to a plant-based diet due to factors such as taste preferences, nutritional worries, and social norms (de Venter Villiers et al., 2024).

Our findings reveal that while nearly half of participants demonstrated awareness of the environmental implications of their food choices, a substantial proportion remained unaware. Nevertheless, a majority acknowledged the potential environmental benefits associated with reducing meat intake. The modest yet noticeable increase in familiarity with, and willingness to try, plant-based meals coupled with generally positive attitudes toward their taste points to a gradual shift in perception. These trends suggest growing consumer awareness of the link between diet and environmental sustainability. Our findings are consistent with global patterns, as highlighted in recent systematic reviews examining consumer attitudes toward meat consumption in the context of environmental concern (Sanchez-Sabate and Sabaté, 2019).

A cross-disciplinary review finds that defaults/choice architecture, greater plant-based availability, pricing measures, and social-norm/information cues effectively reduce meat intake (Kwasny et al., 2022). Recent systematic review report a growing interest in plant-based diets but also emphasize persistent cultural resistance to reducing meat intake (Onwezen et al., 2021; Siddiqui et al., 2022). The systematic review by Kwasny et al. (2022) concluded that interventions leveraging increased availability of plant-based options, pricing strategies, and social-norm or information cues are among the most effective approaches for reducing meat consumption, whereas purely educational strategies showed mixed effects (Kwasny et al., 2022). Many consumers are hesitant to transition due to an attachment to meat and an unwillingness to alter established habits (Kwasny et al., 2022). One of the main barriers to adopting a plant-based diet as reported by Norwegian and French consumers is the lack of knowledge on how to prepare these meals (Varela et al., 2022). Several reviews note that although vegetarians and vegans remain a minority compared with omnivores, their numbers have increased in many countries over the last decade, reflecting greater interest in plant-based eating and meat reduction (Alcorta et al., 2021; Fehér et al., 2020; Selinger et al., 2023). Plant-based diets, such as the Mediterranean diet (Guasch-Ferré and Willett, 2021), the Dietary Approaches to Stop Hypertension (DASH), the New Nordic diet (Krznarić et al., 2021), and the Planetary diet (Willett et al., 2019), allow for the consumption of small quantities of meat and animal-based food products. Food prices are one important barrier, particularly for lower-income

TABLE 7 Awareness and attitudes toward sustainable diets and meat consumption about health and environmental concerns.

Responses	*N* = 1,371 *N* (%)
How familiar are you with the concept of a sustainable diet?	
Not at all familiar	340 (24.8)
Somewhat familiar	593 (43.3)
Moderately familiar	321 (23.4)
Very familiar	117 (8.5)
Do you think it is possible to follow a healthy diet without eating meat?	
Yes	936 (68.3)
No	298 (21.7)
I am not sure	137 (10.0)
What do you think are the biggest challenges to reducing meat consumption for individuals and society as a whole?*	
Cultural or social norms that prioritize meat consumption	604 (44.1)
Taste preferences and lack of familiarity with plant-based foods	459 (33.5)
Cost and accessibility of plant-based foods	284 (20.7)
I do not know	24 (1.8)
How important is sustainability in your food choices?	
Very important	167 (12.2)
Somewhat	630 (46.0)
Not very	392 (28.6)
Not at all	182 (13.3)

*Allowed multiple responses; percentages are of all respondents and may not sum to 100.

households, but our findings and other studies indicate that taste preferences, cooking skills, social norms, and cultural eating habits often play an equal or greater role in shaping meat-reduction behaviors (Fehér et al., 2020; Principato et al., 2025).

In coastal regions such as Bahrain, Oman, Qatar, the United Arab Emirates, and southern Yemen, fish constitutes an essential part of the traditional diet, with consumption levels significantly higher than those observed in inland areas of the region. Nevertheless, despite the prominence of seafood in these diets, prior research has shown that many individuals tend to underestimate the environmental impact associated with animal-based food production (Sanchez-Sabate et al., 2019). Brink et al. (2019) observed that consumer acceptance of dietary change is shaped by multiple factors, including the level of awareness and concern regarding environmental consequences, in addition to the degree of enjoyment and habitual consumption of meat (Brink et al., 2019). At a global level, several national FBDGs have been revised to increasingly favors plant-forward patterns with reduced red/processed meat (Klapp et al., 2022; James-Martin et al., 2022). In the present study, 46% of participants indicated that sustainability plays a role in their food choices, although perceptions of sustainable diets appeared limited. These findings are consistent with evidence from a recent systematic review, which found that sustainability considerations often have minimal influence on actual consumer food choices (Ronto et al., 2022).

This study offers several strengths, including a large and diverse sample drawn from all seven emirates of the UAE, enhancing its regional representation. The use of a bilingual survey instrument (Arabic and English) contributed to cultural inclusivity and accessibility, thereby increasing the study's relevance across varied population groups. The findings provide valuable insights for policymakers and public health professionals, particularly in understanding meat consumption patterns, preferences for alternative protein sources, and the perceived barriers and motivators associated with the adoption of more sustainable diets. However, certain limitations should be acknowledged. The use of convenience and snowball sampling limits the generalizability of the results to the broader UAE population. Moreover, reliance on self-reported data may introduce response and recall biases. The cross-sectional nature of the study restricts causal inference, and the online format may have excluded individuals from rural or lower socioeconomic backgrounds with limited internet access. Moreover, data collection overlapped with the month of Ramadan, when meal timing, social gatherings, and the prominence of meat-based dishes may differ from other times of the year. However, participants were asked about their usual intake over recent months. Additionally, while the study explored general trends in the consumption of meat alternatives, it provided limited detail on the barriers associated with less commonly consumed options such as tofu and imitation meat. Future research would benefit from a more in-depth exploration of sustainability awareness and the factors influencing the acceptance of emerging protein alternatives.

From a policy perspective, our findings suggest that initiatives to encourage lower red-meat intake in the UAE should prioritize health framing and cultural alignment. Therefore, integrating clear, practical guidance on gradually reducing red and processed meat, while maintaining adequate protein intake, into national food-based dietary guidelines and health-promotion campaigns could leverage health concerns, which were the most frequently cited motivator in our sample. Moreover, policymakers and institutions could normalize plant-forward eating by increasing the availability and visibility of appealing, affordable, and halal-certified plant-based options in canteens and catering, supported by procurement policies and pricing incentives. Additionally, targeted communication, through primary care, community centers, and digital platforms, could emphasize both health and environmental co-benefits in simple, actionable messages, focusing on groups who already express some willingness to change. These measures may support a gradual, socially acceptable shift toward more sustainable dietary patterns in the UAE.

4.1 Behavioral science for sustainable food systems

The UAE policy context is increasingly supportive of food-system sustainability through national strategies on food security and net-zero transition. The National Food Security Strategy 2051 emphasizes food security, innovation, and system resilience (Emirates GotUA, 2026), while the UAE Net Zero 2050 Strategy frames decarbonization as a national priority (Emirates GotUA, 2024). Complementing these strategic plans, UAE food security is also embedded within national legislation, with legal analyses indicating that UAE regulatory frameworks explicitly recognise food security as a national priority and assess alignment with

TABLE 8 Bivariate analysis of socio-demographic and health factors in relation to willingness to reduce red meat consumption.

Factors	Category	Willingness to reduce meat consumption		*p*-value
		Yes *N* (%)	No *N* (%)	
Sex	Male	319 (67.3%)	155 (32.7%)	0.583
	Female	617 (68.8%)	280 (31.2%)	
Age category (years)	18–30	414 (67.4%)	200 (32.6%)	0.410
	31–60	503 (69.4%)	222 (30.6%)	
	61 and above	19 (59.4%)	13 (40.6%)	
Emirate category	Abu Dhabi	194 (68.1%)	91 (31.9%)	0.763
	Dubai	227 (70.5%)	95 (29.5%)	
	Sharjah	313 (66.9%)	155 (33.1%)	
	Northern	202 (68.2%)	94 (31.8%)	
Nationality	GCC countries	435 (69.3%)	193 (30.7%)	0.163
	Non-GCC Arab	438 (66.4%)	222 (33.6%)	
	Non-Arab	63 (75.9%)	20 (24.1%)	
Marital status	Single	409 (67.7%)	195 (32.3%)	0.924
	Married	478 (68.7%)	218 (31.3%)	
	Divorced/widowed	49 (69.0%)	22 (31.0%)	
Number of children	No children	480 (67.9%)	227 (32.1%)	0.660
	1–2 Children	163 (66.0%)	84 (34.0%)	
	3–4 Children	205 (70.9%)	84 (29.1%)	
	5 children or more	88 (68.8%)	40 (31.3%)	
Education level	Less than high school	18 (60.0%)	12 (40.0%)	0.424
	High school	181 (69.9%)	78 (30.1%)	
	College/Diploma	159 (72.6%)	60 (27.4%)	
	University degree	456 (67.2%)	223 (32.8%)	
	Higher education	122 (66.3%)	62 (33.7%)	
Employment	Employed	526 (68.5%)	242 (31.5%)	0.955
	Unemployed	236 (67.6%)	113 (32.4%)	
	Student	174 (68.5%)	80 (31.5%)	
Monthly household income (AED)	<5,000	105 (72.4%)	40 (27.6%)	0.217
	5,000 to <10,000	193 (65.2%)	103 (34.8%)	
	10,000 to <20,000	256 (71.1%)	104 (28.9%)	
	20,000 to <30,000	200 (69.4%)	88 (30.6%)	
	30,000 and above	182 (64.5%)	100 (35.5%)	
Medical condition (Yes/No)	Yes	331 (68.0%)	156 (32.0%)	0.856
	No	605 (68.4%)	279 (31.6%)	
BMI category (kg/m^2)	<24.99	410 (68.8%)	186 (31.2%)	0.726
	≥25	526 (67.9%)	249 (32.1%)	

Values are counts with row percentages. "Yes" denotes willingness ratings 4–5 on the 5-point scale; "No" denotes ratings 1–3 (not willing/unsure). Two-sided Pearson χ^2 tests assessed differences across groups; $p < 0.05$ was considered statistically significant.

relevant international agreements, positioning the UAE as an active contributor to global food security (Al-Qodsi et al., 2024). Our results suggest a clear behavioral implementation gap: sustainability was rarely rated "very important" (12.2%) and environmental motivation was modest (17.4%), while health was the dominant motivator (49.4%). This implies that policy and institutional practice in the UAE may be most effective when they lead with health framing while embedding sustainability by default, for example through public-sector procurement standards and institutional catering policies that increase plant-forward availability and normalize sustainable choices without relying solely on pro-environmental motivation.

Future directions should focus less on awareness raising and more on making sustainable choices feel normal, tasty, and easy

in everyday settings. In our data, cultural and social norms (44.1%) and taste or familiarity (33.5%) were the most common barriers, and liking of plant-based meals was low among those who tried them. This points to interventions that reshape choice environments, such as increasing the availability of appealing meat free options in cafeterias and food service settings, which reduces meat selection in real world experiments (Pechey et al., 2022; Garnett et al., 2019). Default nudging approaches are also promising. Ardesch et al. (2025) implemented a vegetarian default in a university cafeteria and found that it more than doubled vegetarian purchases while substantially reducing meat sales, with no evidence of adverse psychological responses over time (Ardesch et al., 2025). Sustainability labeling and alternative proteins are also likely to expand, but labeling effects can be modest when used alone, so pairing labels with stronger structural changes is advisable (Potter et al., 2021).

In conclusion, our findings suggest that willingness to reduce meat consumption among UAE consumers remains limited, despite moderate awareness of related health and environmental considerations. Cultural norms, taste preferences, and low familiarity with plant-based diets appear to be the most salient barriers. To align dietary practice with emerging sustainability and food-security priorities, future efforts should prioritize culturally acceptable, taste-forward plant-based options and implement supportive food-environment strategies that enable a gradual, realistic shift toward more sustainable eating patterns.

Data availability statement

The original contributions presented in the study are included in the article/Supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving humans were approved by the Research Ethics Committee at the University of Sharjah. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

LC: Conceptualization, Project administration, Writing – review & editing, Writing – original draft, Methodology. HK: Writing – original draft, Conceptualization, Writing – review & editing, Methodology, Project administration. MH: Conceptualization, Writing – review & editing, Methodology. HH: Conceptualization, Methodology, Writing – review & editing. TO: Writing – review & editing, Conceptualization, Methodology. MM: Writing – original draft, Formal analysis, Conceptualization, Writing – review & editing. FZ: Writing – review & editing, Writing – original draft. RD: Writing – review & editing, Methodology, Project administration. LS: Writing – review & editing, Project administration, Methodology. AD: Project administration, Methodology, Writing – review & editing.

Funding

The author(s) declared that financial support was not received for this work and/or its publication.

Conflict of interest

The author(s) declared that this work was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

The author LC declared that they were an editorial board member of Frontiers at the time of submission. This had no impact on the peer review process and the final decision.

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