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Understanding Preferences for Low-Carbon Diets and Policies to Address Climate Change in the Gulf Cooperation Council and Arab World

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Abstract

There is a growing consensus about the need to transition human systems and lifestyles in the Gulf Cooperation Council (GCC) and Arab nations to grapple with the challenge of environmental sustainability and climate change, while safeguarding human health and wellbeing. An important but understudied aspect of the transition is how to facilitate a shift towards low-carbon diets. In this research project, we explore how socio-psychological factors influence preferences for low-carbon dietary choices and policies in the GCC and Arab world. Specifically, the study delves into the role of social norms, social referents, attitudes and beliefs on vegetarian versus non-vegetarian food choices and support for a meat tax. To do so, we use theories of social influence, the Theory of Planned Behaviour (TPB) and the Trans-Theoretical Model of Behaviour Change (TTM). We use a vignette experiment to uncover the effect of these factors on food choices, and a contingent valuation experiment to elicit willingness to accept and support a meat tax. Our initial findings reveal that social referents' identity significantly influences dietary choices, with family and friends impacting decisions. Social occasions, such as weekends, are associated with a higher likelihood of choosing plant-based options. The research also examines support for a meat tax, indicating a substantial willingness to accept a VAT on red and processed meat. This study contributes crucial insights into the intricate interplay of cultural, social, and psychological factors shaping dietary preferences in the GCC and Arab world. The findings emphasise the importance of factoring in socio-psychological factors in designing behavioural interventions and policies to foster sustainable and health-conscious dietary practices in the region.

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Introduction

The Gulf Cooperation Council (GCC) and Arab nations face an important challenge in navigating environmental sustainability and climate change by promoting more sustainable lifestyles and consumer choices. These countries are acutely aware of their vulnerability to climate change, necessitating a re-evaluation of prevailing food production systems with high carbon footprints.

In this regard, there has been growing awareness about the need to adopt low-carbon diets by increasing plant-based foods and cutting meat. Leading scientific bodies, including the IPCC and the Lancet Planetary Health Commission, have advocated that the adoption of low-carbon diets holds the potential to significantly reduce greenhouse gas emissions, conserve water resources, and protect biodiversity.¹ This overall amount is much lower than current per capita meat consumption in much of the rich GCC and Arab world.

Beyond environmental gains, the adoption of low-carbon diets has profound implications for public health. Traditional diets in the GCC, often rich in animal products, correlate with prevalent health issues such as obesity, cardiovascular diseases, and diabetes. Transitioning to plant-based diets, inherently lower in saturated fats and cholesterol, offers a pathway to improved public health and environmental outcomes.

There is therefore growing conversation about how to promote low-carbon diets through comprehensive awareness and behaviour change campaigns, and educational initiatives. Governmental policies play a pivotal role in facilitating this transition. Incentives for plant-based diets, such as meat taxes, have been debated in other regions in the world and advocated by economists to encourage the adoption of low-carbon diets.² While the public environmental and health benefits of low-carbon diets are evident, and there are policy tools to help aid this transition, challenges arise from entrenched cultural preferences and traditional dietary social norms. There is very little evidence about how socio-psychological and contextual factors affects dietary choices and policy preferences.

In this research project, we examine the public's preferences for low-carbon diets and policies to address climate change in the GCC and Arab world. Past work shows that social influence i.e., the role of what others in society do, say and think, is a crucial determinant of food and dietary choices.³ People often look to social norms, i.e., the perceived appropriateness and practice of behaviours in a setting. They also pay attention to the behaviour of 'social referents' or specific other people in a given context to understand what to do and why.⁴ Apart from social norms and the referents themselves, other psycho-

¹ 'Safeguarding Human Health in the Anthropocene Epoch,' *The Lancet*, 16 July 2015. Available at: <https://www.thelancet.com/commissions/planetary-health> (accessed 9 October 2024); 'Sixth Assessment Report', IPCC, 20 March 2023. Available at: <https://www.ipcc.ch/assessment-report/ar6/> (accessed 9 October 2024).

² David Klenert, Franziska Funke & Mattia Cai, 'Meat Taxes in Europe can be Designed to Avoid Overburdening Low-Income Consumers,' *Nature* 4 (2023), pp. 894–901. Available at: <https://www.nature.com/articles/s43016-023-00849-z> (accessed 9 October 2024).

³ Daniele Pollicino et al., 'Social Influence and Sustainable Food Choices,' *LSE Working Paper* (2023).

⁴ Elif Naz Çoker et al., 'Perceptions of Social Norms around Healthy and Environmentally-Friendly Food Choices: Linking the Role of Referent Groups to Behavior,' *Frontiers in Psychology* 13 (2022).

logical factors and attitudes can also matter. For example, people may have perceptions of plant-based diets as less healthy, less tasty, and in some cases even immoral or going against religious codes of conduct. Thus, both personal tastes, motivations, beliefs, and attitudes, as well as socio-religious norms, cultural practices, and rituals, can influence people's preferences and willingness to adopt more plant-based foods across different contexts such as within the home or at work. While there has been a rapid growth in scholarship about these factors from Europe and the US, there is little empirical evidence about the role of these factors on their preferences towards adopting low-carbon diets and policies in the GCC and Arab world. In this working paper, we focus on Saudi Arabia and the UAE. Both countries rely substantially on food imports and meat imports, especially cattle, sheep and goats.⁵

We first examine how socio-cultural factors especially social referents and norms influence low-carbon dietary choices in a vignette experiment. We catalogue the identity of the social referent (family, friend or co-worker), their motivations (e.g. health, environmental or religious motivation) and choices (e.g. veg versus non-veg choices), apart from the social occasion (e.g. weekday, weekend or religious occasion) itself. To understand the role of psychological antecedents such as personal and social attitudes, beliefs, and habits, we use two theoretical frameworks: the Theory of Planned Behaviour and Trans-Theoretical Model of Behaviour Change. We then look at support for these models on intentions to adopt low-carbon diet choices (more plant-based foods and reducing meat-eating) as well as incentive-based policies such as a meat tax.

In the next section, we briefly review the role of social norms and referents in guiding low-carbon food choices, as well as the TPB and TTM frameworks. The following section outlines the method and we then present the results.

Social Norms, Referents and Low-Carbon Diets

Broadly speaking, a social norm is an unwritten rule or expectation within a community that guides individuals' behaviour. They are regarded as the 'rules and standards that are understood by members of a group, and that guide and/or constrain human behaviour.'⁶ In social psychology literature, several theories including the most popular 'Theory of Planned Behaviour' framework,⁷ the 'Focus Theory of Normative Conduct',⁸ the 'Social Norms Approach'⁹ and so on feature social norms as a prominent socio-psychological antecedent to behaviour. While norms have been operationalised in many ways, the main

⁵ Azmat Gani, 'Achieving Food Security through Live Animal Imports in the Gulf Cooperation Council Countries,' *British Food Journal* 123/4 (2020).

⁶ Robert B. Cialdini & Melanie R. Trost, 'Social Influence: Social Norms, Conformity and Compliance', in Daniel Todd Gilbert, Susan T. Fiske & Gardner Lindzey (eds), *The Handbook of Social Psychology*, 4th ed. (New York: McGraw-Hill, 1998), pp. 151–92.

⁷ Icek Ajzen, 'The Theory of Planned Behavior', *Organizational Behavior and Human Decision Processes* 50/2 (1991), pp. 179–211.

⁸ Robert B. Cialdini, Raymond R. Reno & Carl A. Kallgren, 'A Focus Theory of Normative Conduct: Recycling the Concept of Norms to Reduce Littering in Public Places,' *Journal of Personality and Social Psychology* 58/6 (1990), pp. 1015–26.

⁹ H. Wesley Perkins, ed., *The Social Norms Approach to Preventing School and College Age Substance Abuse: A Handbook for Educators, Counselors, and Clinicians* (Hoboken: Jossey-Bass/Wiley, 2003).

distinction in the literature is between descriptive norms (signalling the prevalence of a specific behaviour) and injunctive norms (signalling behaviour that is commonly approved or disapproved of in a given situation). Whilst conformity to the descriptive norm seeks to fulfil the intrapersonal goal of making accurate/effective decisions and the desire to be correct, conformity to injunctive norms seeks to fulfil the interpersonal goal of gaining social approval and affirming one's role within a group.¹⁰ More recently, descriptive static norms describe the current adoption of a particular behaviour, whereas dynamic norms describe how the behaviour of a group is changing over time.¹¹

A growing number of studies suggest that social norms can exert a significant influence on reducing meat-eating or alternately, the adoption and maintenance of plant-based diets. But the causal and correlational evidence still seems mixed with some studies showing a non-statistically significant association or limited treatment effects. One reason may be that few studies explicitly mention a relevant and tangible social referent group, i.e., the social group that performs the stated behaviour, e.g., fellow students, citizens of the same country or family member. According to Social Identity Theory, increasing the social relevance of the referent group will increase the following of a norms messaging intervention.¹² Only a few studies have probed whether manipulating how the social referent group influences low-carbon diets. Results from recent studies provide initial evidence in favour of the hypothesis that the perception of stronger social norms around climate-friendly food choices in a closer and more socially relevant referent group will support consumers' selection of food products that had less negative environmental.¹³ It has also been argued that social norm appeals might be more effective in collectivistic cultures, such as the Middle East, Asia and Latin America, rather than in individualistic ones, for example the US and northern Europe.¹⁴ In this study, we explicitly examine the role of the identity, motivation and behaviour of the social referent in affecting low-carbon dietary choices in a vignette experiment as described below, apart from the social occasion itself (see Table 1). In addition, we examine social norms as predictors of support for reducing meat eating and a meat tax in GCC and Arab countries via the TPB framework as discussed below. We test the following hypotheses:

H1. The motivation (health, environment, religious or hedonic) of the social referent will be associated with outcomes.

H2. The relational identity of social referent (as close family, friend, or non-Muslim friend) will be associated with outcomes.

¹⁰ Ryan P. Jacobson, Christian R. Mortensen & Robert B. Cialdini, 'Bodies Obligated and Unbound: Differentiated Response Tendencies for Injunctive and Descriptive Social Norms,' *Journal of Personality and Social Psychology* 100/3 (2011), pp. 433–48.

¹¹ Gregg Sparkman & Gregory M. Walton, 'Dynamic Norms Promote Sustainable Behavior, Even if It Is Counternormative,' *Psychological Science* 28/11 (2017), pp. 1663–74.

¹² Terry L. Childers & Akshay R. Rao, 'The Influence of Familial and Peer-based Reference Groups on Consumer Decisions,' *Journal of Consumer Research* 19/2 (1992), pp. 198–211.

¹³ Elif Naz Çoker et al., 'Dynamic Social Norm Messaging Intervention to Reduce Meat Consumption: A Randomized Cross-Over Trial in Retail Store Restaurants,' *Appetite* 169 (2022).

¹⁴ Ricky Y. K. Chan & Lorett B. Y. Lau, 'Explaining Green Purchasing Behavior: A Cross-Cultural Study on American and Chinese Consumers,' *Journal of International Consumer Marketing* 14/2–3 (2002), pp. 9–40; Heejung Kim & Hazel Rose Markus, 'Deviance or Uniqueness, Harmony or Conformity? A Cultural Analysis,' *Journal of Personality and Social Psychology*, 77/4 (1999), pp. 785–800.

H3. The timing of the choice (weekend, weekday, religious festival) will be associated with outcomes.

Theory of Planned Behaviour (TPB)

The Theory of Planned Behaviour (TPB) is a widely recognised social psychological model used to understand and predict a wide range of intentional human behaviour and to design interventions. The theory posits that behavioural intentions are the key determinants of actual behaviour and are influenced by three primary factors: attitudes toward the behaviour, subjective norms, and perceived behavioural control. Attitudes reflects an individual's positive or negative evaluation of performing a particular behaviour, including beliefs about the outcomes or consequences of the behaviour and the overall value they place on these outcomes. Subjective norms refer to the perceived social pressure or expectations from important others – such as family, friends, or colleagues – regarding the performance of a specific behaviour. While subjective norms include the perception of whether others approve or disapprove of the behaviour, it doesn't specify the social referent, or aspects such as whether there are perceptions that the norm is changing. Perceived Behavioural Control captures the individual's perception of the ease or difficulty of performing the behaviour and is associated with a stronger intention to engage in the behaviour, as individuals are more likely to pursue actions they believe they can control. Future models like the extended theory of planned behaviour include aspects such as habits and past behaviour.

Several studies have examined the effect of the TPB variables on low-carbon diets and food behaviours. For example, research using a national sample of the UK indicated that attitudes, subjective norms, and perceived control explain 57 percent of the variation in intentions to reduce meat consumption. In turn, past behaviour and intention explain 31 percent of the variance in self-reported meat consumption behaviour four weeks later. Somewhat surprisingly, habit did not have any predictive utility over and above the TPB constructs. TPB has also been useful in other domains such as buying organic foods or reducing food waste.¹⁵ Most of this evidence is from Europe and the US. However, there is some emerging evidence on the role of TPB factors on GCC and Arab diets. For example, on a study of Muslims in Canada and Kuwait, Bakr et al.¹⁶ found that attitudes, subjective norms, and behavioural control have a significant effect on purchase intentions of plant-based meat alternatives. Studies, however, do not integrate TPB with the TTM or examine how these variables affect WTP to meat tax, or reduce meat-eating per say. We will test the following hypothesis:

H4. We will examine associations factors based on the TPB, especially attitudes, perceived subjective social and personal norms, perceived behavioural control, and meat-eater identity on intentions to adopt low-carbon diets and support for a meat tax.

¹⁵ Elif Naz Çoker & Sander van der Linden, 'Fleshing Out the Theory of Planned of Behavior: Meat Consumption as an Environmentally Significant Behavior,' *Current Psychology* 41/2 (2022).

¹⁶ Yousra Bakr, Hayat Al-Bloushi & Mohamed Mostafa, 'Consumer Intention to Buy Plant-Based Meat Alternatives: A Cross-Cultural Analysis,' *Journal of International Consumer Marketing* 35/4 (2023), pp. 420–35.

Trans-Theoretical Model of Behaviour Change (TTM)

The Transtheoretical Model (TTM) of behaviour is a comprehensive framework that explores the process of intentional behaviour change across domains like health and addiction, has been increasingly applied to understand dietary change, and in behavioural interventions. TTM posits that individuals progress through the following distinct stages of behaviour change. 1) Precontemplation: individuals are not actively considering behaviour change. They may lack awareness of the need for change or feel resistant to it; 2) Contemplation: individuals recognise the need for change and consider the possibility of taking action in the near future. However, they may remain ambivalent about the specific steps to take. 3) Preparation: Individuals are making concrete plans for change. They may be taking initial steps, such as gathering information, setting goals, or making small modifications to their behaviour. 4) Action: the implementation of the planned changes, where individuals are actively modifying their behaviour and making tangible efforts to adhere to their chosen course; and 5) Maintenance: Once the desired behaviour has been established, the maintenance stage focuses on preventing relapse and consolidating the gains achieved during the action stage. Individuals in this stage work to integrate the new behaviour into their daily lives; 6) Termination: in some versions of the model, termination represents a stage where the individual has completely solidified the behaviour change, and the risk of relapse is minimal. The TTM recognises that behaviour change is a dynamic process, and individuals may cycle through these stages multiple times before achieving long-term success. By understanding the stages of behaviour change and incorporating appropriate interventions tailored to an individual's stage, the Transtheoretical Model provides a practical framework for professionals to design effective strategies for promoting positive behaviours and facilitating sustainable change.

There have been efforts to combine the TPB and TTM frameworks by examining the relative influence of the TPB variables at each of the TTM's stages of change.¹⁷ These studies have shown that the valence of TPB variables tend to increase (e.g. more positive attitudes, stronger perceived social pressure, increased perceived behavioural control) as a person progresses from earlier to later stages of change (e.g. from precontemplation to action). In one of the few cross-country comparisons, Wolstenholme et al.¹⁸ showed differences in the relative impact of subjective norm, perceived behavioural control, and additionally 'meat-eater identity', on behavioural intention across the different stages of change and across the UK and Italy. They found attitude remained a stable predictor across the different stages of change and in both countries. We examine the role of the TPB and TTM predictors in the GCC and Arab countries.

H5: We will examine associations factors based on the TPB (attitudes, perceived subjective social and personal norms, perceived behavioural control, and meat-eater identity) by stage of changes based on the Transtheoretical model on intentions to adopt low-carbon diets and support for a meat tax.

¹⁷ Christian Weibel et al., 'Reducing Individual Meat Consumption: An Integrated Phase Model Approach,' *Food Quality and Preference* 73 (2021), pp. 8–18.

¹⁸ Emily Wolstenholme et al., 'Explaining Intention to Reduce Red and Processed Meat in the UK and Italy Using the Theory of Planned Behaviour, Meat-Eater Identity, and the Transtheoretical Model,' *Appetite* 166 (2021). Available at: <https://doi.org/10.1016/j.appet.2021.105467> (accessed 22 October 2024).

Methods, Materials and Data

Study Aims, Design and Scope

The project is a multi-country survey study that aims to understand different socio-cultural and psychological factors affecting low-carbon dietary choices (in this study defined as reducing consumption meat and increasing consumption of plant-based food) among individuals living in the GCC and other Arab countries, especially Saudi Arabia and the UAE.¹⁹

The survey is divided into broadly three parts: a vignette experiment exploring how the motivation, behaviour and identity of the social referent and the social occasion, affects low-carbon dietary choices; followed by a component assessing TPB and TMM factors, as well as others psychological antecedents that have been found to be relevant in predicting behaviours such as motivations to eat meat and meat-eater identity, and finally, a contingent valuation scenario to assess support for, or willingness to pay (WTP), a meat tax. In addition, there were questions on climate change perception and demographic characteristics like age, gender, occupation, education, and religious identity and practices.

In terms of study design, we exploit differences both within and between subjects to study various hypotheses outlined above. Specifically, the vignette task adopts a within and between subjects mixed design, where each subject sees five different iterations of the vignette that randomly varies the social referent's identity, decision, motivation, and social occasion, and is asked to make the same choice in each instance (either to choose a veg or a non-veg meal). To examine how the TPB and TTM factors affects intentions and WTP a meat tax, we will examine between-subjects associations. We will additionally explore socio-demographic characteristics, meat eating habits, climate change awareness, pro-environmental identity (between subjects).

Survey Implementation and Data Collection

Participants will be recruited through an independent market research company called YouGov. Participants will take the survey on Qualtrics and will be rewarded proportionally based on the length of survey (participants receive points from YouGov that can be then redeemed as cash). For this report, we consider participants recruited from Saudi Arabia and the UAE. To be included in the study, the participants must be at least 18 years old and identify as having an omnivore diet, not have any restrictions or allergies that limit their food choices, and, finally, identify as Muslim. Quotas were set to aim towards an equal representation of men and women in the sample.

¹⁹ While the entire sample consists of observations from the UAE, Saudi Arabia, Kuwait, Morocco and Egypt, the current paper focuses its analysis on a pooled samples from the UAE and Saudi Arabia, since data collection was being completed during submission.

Survey Sample Size and Exclusion Criteria

Considering budget and sample accessibility via market research companies, our target sample was a total of 5000 participants, equally split by country as follows:

1. Saudi Arabia (2500, 6 vignettes each for a total of 15,000 observations);
2. United Arab Emirates (2500, 6 vignettes each for a total of 15,000 observations);

It is important to note what follows: the sampling is non-probabilistic as it draws from online panels; further, some portion of the sample need to be removed from the final sample due to lack of attention, inconsistency in answers, etc. We will omit participants who fit the following criteria: vegetarians, non-Muslims, those with dietary prescriptions/restrictions especially in relation to health vulnerabilities, and those failing attention check and seriousness check questions. As a result, the final valid samples for Saudi Arabia and the UAE were respectively 1931 (11586 observations) and 1973 (11838 observations).

Vignette Experiment

We will manipulate four factors in the vignette task, where participants will be asked to imagine going out for a meal with a member from a social referent group. The following factors will be varied:

1. Relational identity of the social referent group member: participants will be asked to imagine choosing to share a meal with either a close family member, a close friend, or a close non-Muslim friend.
2. Behaviour of the social referent group member: either a vegetarian or those who have meat as their main meal.
3. Motivation for the choice of the referent group member: participants will be asked to imagine choosing to share a meal that is either described as tasty, healthy, eco-friendly, or religiously appropriate.
4. Social occasion and/or the timing of meal: participants will be asked to imagine choosing a meal either on a weekday, on a weekend, or during a religious occasion.

Each participant sees up to 6 vignettes which randomly vary a combination of the four factor attributes in Table 1. The full factorial consists of a total of 72 vignettes. Total Combinations are as follows: (Number of Motivation Levels) * (Number of Social Referent Levels) * (Number of Time Levels) * (Number of Behaviour Levels) Total Combinations = $4 * 3 * 3 * 2 = 72$.

Table 1: Factors in the Vignettes

Factors	Categories		
1) Social Referent Motivation	Hedonic*	Health	Environmental
2) Social Referent Identity	Family	Friend	Non-Muslim Friend*
3) Social Occasion/Time	Weekday	Weekend	Religious Occasion (Eid Al Adha)*
4) Social Referent Behaviour	Selecting Veggie	Selecting Meat	

* the comparison category used in the data analysis section

Outcome Measures and Other Variables

To measure the intentions, we ask participants to indicate to what extent they agree with the following statement on a 5-point Likert scale (Strongly Agree, Strongly Disagree): ‘I intend to reduce my meat consumption’. We measure the TPB and TMM variables, and others such as meat-eater identity following Wolstenstome et al.²⁰ To measure the willingness to pay a meat tax, participants are asked a dichotomous choice Contingent Valuation question. They were first asked if whether they would be willing to pay (WTP) an extra 10 percent VAT (Value Added Tax) on red meat and processed meat if their country imposed it. If they answered yes, they would be asked if they would be willing to pay a 20 percent tax; if they said no to the first question, instead, they were asked if they would be willing to pay a 5 percent tax. We additionally measure climate change concern and risk perception, religious identification and so on, following Shreedhar, Contu et al.²¹

Analytical Methods

For those items which need to be aggregated into a single score, we will take the mean score after checking that the Cronbach’s alpha is equal to or greater than 0.6. In this initial report, we will use simple logistic regression analyses to check associations between variables.

²⁰ Wolstenholme et al., ‘Explaining Intention to Reduce Red and Processed Meat in the UK and Italy using the Theory of Planned Behaviour, Meat-Eater Identity, and the Transtheoretical Model’.

²¹ Ganga Shreedhar et al., ‘Greening Systems by Greening Religion: Experimental Evidence on Eco-Islamic Values and Public Support for Water-Energy-Nature Nexus Policies in Kuwait,’ *LSE Middle East Centre Kuwait Programme Paper Series 24* (March 2024).

Results

Sample and Descriptive Characteristics

We report in Table 2 the sample characteristics for Saudi Arabia and the UAE, as per the valid answers collected. These respondents are all Muslims, meat eaters, and passed all the attention checks placed in the survey. In line with the population's characteristics, the UAE sample presents a share of 10.7 percent of Emirati respondents.

Table 2: Sample Characteristics

	Saudi Arabia		UAE	
	Count	%	Count	%
Gender				
Male	974	50.4%	1114	56.4%
Female	950	49.2%	857	43.4%
Prefer not to say	7	0.3%	2	0.1%
Nationality				
Local	1240	64.2%	211	10.7%
Expatriate	691	35.8%	1762	89.3%
Other Characteristics				
Meat eater	1931	100%	1973	100%
Muslim	1931	100%	1973	100%
Average Age	35.5		35.3	
Median Age	35		34	

Results from Vignette Experiment

Next, we report in Table 3 the main findings relative to the vignettes' experiments. We also include, as part of the model estimation, the effect of covariates including TPB and TTM factors. We find that in both the UAE and Saudi Arabia, the identity of the social referent matters: when dining with family or friends, respondents are more likely to order their own meat-based main dish. The social occasion also matters, with weekend and weekday linked to lower chance of ordering this as opposed to during Eid Al Adha. With regards to the motivation of the social referent, we do not find any motivation presented to have a significant impact on choice.

Table 3: Logit Regression. Dependent Variable: Choice of Main Dish

	Saudi Arabia (n=1931)		UAE (n=1973)		Saudi Arabia & UAE (n=3904)	
	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error
Choice: order dish with meat (1) vs order dish without meat (0)						
They chose meat	1.58***	0.50	2.10***	0.05	1.84***	0.03
Family	0.75***	0.05	0.40***	0.05	0.57***	0.04
Friend	0.59***	0.05	0.38***	0.05	0.49***	0.04
Weekday	-0.15***	0.05	-0.31***	0.05	-0.23***	0.04
Weekend	-0.18***	0.05	-0.26***	0.05	-0.22***	0.04
Religious motivation	0.02	0.72	-0.04	0.06	-0.01	0.04
Environmental motivation	-0.02	0.68	-0.03	0.06	-0.02	0.04
Healthier motivation	0.04	0.48	-0.03	0.06	0.00	0.04
Country=Saudi Arabia	/	/	/	/	0.07	0.05
Constant	-0.44	0.35	-0.82**	0.34	-0.68***	0.24
Locals	-0.00	0.07	-0.15	0.10	-0.04	0.05
Religiosity (average)	0.18***	0.06	0.17***	0.05	0.17***	0.04
Personal norms (average)	-0.241***	0.04	-0.19***	0.04	-0.21***	0.03
Social norms (average)	-0.08*	0.04	-0.07	0.04	-0.07**	0.03
Meat eater (average)	0.32***	0.05	0.32***	0.04	0.32***	0.03
Meat serving (average)	-0.00	0.02	0.02	0.02	0.00	0.01
Perceived behavioural control (average)	-0.21***	0.05	-0.17***	0.05	-0.189***	0.03
TTM: contemplation	0.09	0.11	0.18	0.11	0.13*	0.08
TTM: preparation	-0.24	0.17	-0.10	0.15	-0.16	0.11
TTM: action	-0.17	0.12	0.06	0.11	-0.04	0.08
TTM: maintenance	-0.14	0.13	-0.34***	0.12	-0.24***	0.08
TTM: termination	-0.20	0.21	-0.21	0.18	-0.20	0.13
TTM: relapse	0.69*	0.41	-0.54	0.39	0.09	0.28

Level of significance:*** 1%, ** 5%, *10%. Robust standard errors.

Note: Hedonic is the comparison group for Motivation, Non-Muslim Friend is the comparison group for social referent and Religious occasion (Eid Al Adha) is the comparison group for weekday and weekend. The random effects specification was employed to allow to estimate the impact of variables constant at the individual level.

Across both the countries considered, we see a number of covariates significantly driving the choice of meat, regardless of the context presented in the vignettes. These are the extent of religiosity, being a meat eater (more religious respondents, and those who declare themselves as more frequently eating meat, tended to more often choose meat in the survey), as well as personal norms, social norms and perceived behavioural control (with individuals scoring higher in these variables being less likely to choose meat). It also emerges that those identifying themselves in a state of maintenance as per the TTM ('I have reduced my meat consumption in the last few months and feel satisfied with my current level of consumption') to be less likely to choose to consume meat

Willingness to Support Meat Tax

Moving to the answers to the meat tax questions (Table 4), we find that in both Saudi Arabia and the UAE a similar share of respondents said yes to the first bid (namely, a 10% VAT tax on red and processed meat): 42% in Saudi Arabia and 38% in the UAE. A similar share of respondents who said yes to the first bid, also said yes to a 20% VAT tax: 55% in Saudi Arabia and 54% in UAE. These results show that a meat tax could be a potentially feasible option in these countries. At the same time, it is important to highlight that this is a hypothetical setting and hence answers need to be interpreted with caution.

Table 4: Meat Tax Results

	Answer to Contingent Valuation Questions			
		Yes	No	Do Not Know
Saudi Arabia	1st bid: 10% Tax	41.6%	37%	21.3%
	2nd bid if yes: 20% Tax	55.7%	28.1%	16.2%
	2nd bid if no: 5% Tax	14.8%	58.5%	26.7%
UAE	1st bid: 10% Tax	38.3%	42.3%	18.8%
	2nd bid if yes: 20% Tax	54.3%	31.8%	13.8%
	2nd bid if no: 5% Tax	20.7%	60.2%	19%

Table 5: Logistic Regression Results to Explore Determinants of Meat Tax Acceptance

Dependent Variable: Yes to 10% VAT tax	Saudi Arabia (n=1931)		UAE (n=1973)		Saudi Arabia & UAE (n=3904)	
	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error
Locals	0.32***	0.10	1.03***	0.15	0.54***	0.08
Religiosity (average)	-0.05	0.08	-0.16**	0.08	-0.11*	0.06
Personal norms (average)	0.10	0.07	0.25***	0.07	0.16***	0.05
Social norms (average)	0.25***	0.06	0.14**	0.07	0.21***	0.04
Meat eater (average)	0.11	0.07	0.28***	0.06	0.19***	0.04
Meat serving (average)	0.15***	0.03	0.15***	0.03	0.15***	0.02
Perceived Behavioural control (average)	-0.00	0.07	-0.04	0.08	-0.02	0.05
TTM: contemplation	0.06	0.16	0.04	0.17	0.04	0.12
TTM: preparation	0.10	0.22	-0.30	0.24	-0.06	0.16
TTM: action	-0.47**	0.18	-0.14	0.17	-0.30**	0.12
TTM: maintenance	-0.18	0.19	-0.00	0.18	-0.09	0.13
TTM: termination	0.31	0.31	-0.34	0.28	-0.04	0.20
TTM: relapse	-0.29	0.57	0.13	0.60	-0.08	0.41
Country=Saudi Arabia	/	/	/	/	-0.20**	0.08
Constant	-2.37***	0.51	-2.44	0.52	-2.32	0.36

Level of significance: *** 1%, ** 5%, *10%. Robust standard errors.

In terms of the determinants of saying yes to the 10 percent VAT, it can be seen that in both countries this is favoured by locals and those who consume meat. In addition, individuals scoring higher in terms of social norms are more likely to accept the introduction of the VAT on red meat.

In terms of stages of change, in Saudi Arabia it emerges that individuals in the stage of action are less likely to accept the tax. Greater average religiosity is associated in the UAE sample with lower acceptance of the tax. The individual average score of perceived behavioural control does not appear to affect acceptance of the proposed tax.

Discussion and Conclusion

Embracing sustainable dietary practices aligns the GCC with global efforts to combat climate change, fosters economic diversification, and promotes the health and well-being of its people. The transition to low-carbon diets represents a pivotal step towards a more resilient, environmentally conscious and prosperous future for the GCC. Despite the growing importance of food and meat consumption behaviours in climate, health and food security, there is very little GCC or other Arab countries-based research on the psycho-social factors impacting food choices, including culture, social norms and religious practices.

In this study, we share the first evidence on how characteristics of a person's motivation (health, environment, hedonic, religious motivation), the social referent (family, friend, or non-Muslim friend) and situation (weekday, weekend, religious occasion) affects low-carbon dietary choices, as well as examine how the role of TPB factors on intentions and WTP meat tax, and strength of TPB factors on the stages of change proposed by TTM.

From this initial analysis it can be concluded that significance of the social referent's identity is evident: individuals tend to choose their own meat-based main when dining with family or friends compared to dining with a non-Muslim friend but are less inclined to select their own vegetable main in such situations. However, when considering the motivation of the social referent, none of those proposed turned out to be significant in directly affecting the choice of meat consumption.

The importance of the social referent in predicting food choices suggests that the people whom one is surrounded by is an important contextual factor affecting people's willingness to reduce meat. We found also that individuals scoring higher in TPB factors personal norms, social norms and perceived behavioural control, and those identifying themselves in a stage of maintenance as per TTM, tend to choose meat less frequently. These insights can be leveraged both in behavioural interventions, e.g. when choosing role models in educational interventions or designing social norm and other informational interventions and campaigns.

Additionally, the context of the social occasion plays a role, as individuals are less likely to opt for their own meat main during both weekends and weekdays compared to during Eid Al Adha. This suggests that religious norms and beliefs are an important factor influencing how flexible people are about diets. This finding suggests that a potentially fruitful time to intervene would be on non-religious days.

Finally, it appears that the meat tax is a potentially viable option in Saudi Arabia and the UAE, especially among individuals who possess strong individual and social norms. While public support for a meat tax has also been documented in other geographical settings, for example in Europe, it has been far more politically contentious (e.g. in the UK) to implement in practice. Future work can examine other aspects such as how the design of the meat tax (e.g. level, framing) matters as well.

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