RESEARCH
SERIES
NUMBER 186
MAY 2024

WHAT IS PREVENTING INDIVIDUAL CLIMATE ACTION? IMPACT AWARENESS AND PERCEIVED DIFFICULTIES IN CHANGING TRANSPORT AND FOOD BEHAVIOUR

SHANE TIMMONS, YLVA ANDERSSON, MARIA LEE AND PETE LUNN

AN INSTITIÚID UM THAIGHDE EACNAMAÍOCHTA AGUS SÓISIALTA
ESRI ECONOMIC & SOCIAL RESEARCH INSTITUTE

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RESEARCH SERIES

NUMBER 186

Available to download from www.esri.ie

https://doi.org/10.26504/rs186

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ACKNOWLEDGEMENTS

This research was funded by the Environmental Protection Agency as part of Phase IV of the EPA-ESRI Research Programme. We are especially grateful to Mary Frances Rochford and Desmond O' Mahony at the EPA for helpful feedback on initial findings. We thank Ciarán Lavin at the SEAI for help estimating the cost of household energy behaviours. We also thank members of the Psychological Society of Ireland's Special Interest Group for Addressing the Climate and Environmental Emergency for helpful comments on an early presentation of this work.

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EXECUTIVE SUMMARY

Mitigating climate change requires large and, by historical standards, rapid changes to policy, business processes and individual behaviour. This report examines awareness of and perceived difficulty with individual behaviour change with respect to two actions associated with high levels of emissions: transport and food choice. A nationally representative sample of 1,200 adults completed an online study about everyday transport and food behaviour, run in September 2023. After completing a diary task about the previous day, participants identified the parts of their day that mattered most for their carbon footprint. Answers were elicited via incentivised, open text questions to prevent pre-set options biasing responses. Participants also answered standard survey questions about their use of various modes of transport in a typical week and their consumption of various foods. Participants who reported wanting to change their transport behaviour and diet 'to reduce their carbon footprint' (47 per cent and 42 per cent, respectively) listed reasons why it is difficult for them to do so, again via open text questions.

The study produced the following findings:

- When asked to identify parts of their day that matter for their carbon footprint, the majority listed behaviours associated with transport (64 per cent) and home energy use (56 per cent). Within home energy use, cooking appliances were listed most often (20 per cent), although home and water heating (listed by 18 per cent) and white appliances (listed by 13 per cent) contribute far more to energy bills and emissions.
- Very few people (4 per cent) listed any aspect of their diet, with more than twice as many (9 per cent) mentioning lower-impact aspects of the food production process, such as whether food was produced locally or organically.
- Over half of people travel by private vehicle five or more days per week, with one-in-four doing so every day and many journeys covering relatively short distances. The most common response for using public transport, cycling or walking in a typical week is 'never' (36 per cent, 84 per cent and 24 per cent, respectively). As expected, living in a rural area and outside of Dublin is strongly predictive of driving more frequently. Being older, working, being born in Ireland and having a child at home are also associated with driving more often.
- Almost half the population (46 per cent) report eating red meat more than one day per week. The strongest predictor of red meat consumption is being a man (54 per cent more than one day per week vs 38 per cent of women). Young people (under 40 years) eat beef and lamb slightly less often than older people (over 60 years; 45 per cent vs 49 per cent, respectively) but consume other types of meat more often. There are no differences in meat consumption between urban and rural residents.

- One-in-four people report having lessened their driving frequency to reduce their carbon footprint. This group drives, on average, one day less per week than others.
- Almost half (47 per cent) of people report wanting to reduce their transport emissions. This group most often think about switching to public transport (53 per cent), followed by active travel (31 per cent), and purchasing an electric vehicle (EV) (14 per cent). With respect to specific reasons for finding change difficult, this group mostly cite availability and reliability of public transport (49 per cent) and cost (23 per cent). Hence, the main reasons cited by the public are those with proposals or action underway as part of the Climate Action Plan (Government of Ireland, 2023).
- One-in-four people also report having changed their diet to reduce their carbon footprint, but the figure for reducing red meat intake is lower (18 per cent). The most common perceived difficulty among those willing to change their diet (42 per cent of the sample) is cost (36 per cent of those willing to change), despite other evidence that reducing one's dietary carbon footprint could save consumers money. Not knowing what to eat is the second most common difficulty (23 per cent of those willing to change). These reasons present opportunities for low-cost policy initiatives to inform the public about cost-effective ways to reduce the carbon footprint of their diet.
- There is little evidence that climate action is the purview of the urban middle-classes. Living area predicts reliance on private vehicles but not diet, suggesting the main difference between urban and rural populations is the availability of sustainable transport options. People with higher educational attainment are more likely to report having reduced the amount they drive, but there is no difference in their current driving frequency compared to groups with lower levels of educational attainment. They also report having reduced their consumption of red meat in order to reduce their carbon footprint, but they currently consume more than groups with lower levels of educational attainment. There are also few age-related differences. Older adults report driving more frequently and travelling by public transport or active modes less often than younger adults, but there is little difference in their consumption of red meat and in their ability to identify actions that matter for their carbon footprint.
- The results have important policy implications. For transport, the findings suggest that awareness raising on the sources of emissions is unlikely to be of further benefit. That said, there may be benefit to encouraging greater awareness of active travel; the majority fail to consider shifting towards walking or cycling when thinking about changing their behaviour. The largest gains, however, are more likely to be achieved by increasing the supply (and reliability) of accessible public transport, particularly outside Dublin, supporting the aim of the Climate Action Plan for Transport.

- For food, there is clear scope to improve awareness of the link between type of food consumed and greenhouse gas emissions, particularly with respect to relative impacts. Lack of awareness is perhaps unsurprising, as there is no provision in the Climate Action Plan (Government of Ireland, 2023) for encouraging sustainable diet shifts. Providing information on what to buy and how to prepare food may help the public to reduce the volume of high-carbon food consumed, while eating more healthily and potentially saving money.
- For both transport and food, cost was among the top reported reasons for finding changes difficult among those willing to change their behaviour. Taxation of emissions and subsidies for climate friendly options may therefore be likely to encourage and facilitate behaviour change, but consideration needs to be given to avoid regressive effects on lower income households.

CHAPTER 1

Introduction

The public report being worried about climate change, but many continue to engage in behaviours associated with high levels of greenhouse gas emissions (see, for example, Leiserowitz et al., 2021; Timmons and Lunn, 2022). This apparent contradiction is not explained by perceptions of diminished individual or collective responsibility: nine-in-ten people report that everyone should be doing what they can to reduce greenhouse gas emissions and that the public should be doing more than they currently are (Leiserowitz et al., 2021). Most also believe that there is still time to reverse the effects of climate change and that their own actions can make a difference (RED C, 2023). Given broadly positive attitudes to behaviour change, our aim in the present study was to identify factors that might be preventing the adoption of pro-environmental behaviours.

Climate change is a 'super wicked' problem; there are complex interactions between contributing factors, no straightforward solutions, multiple stakeholders with competing interests and time to resolve it is limited (Levin et al., 2012). Part of the challenge with changing behaviour for climate mitigation stems from the breadth of relevant actions (IPCC, 2023). Our interest was in behaviours that, (1) for at least some consumers, have a degree of choice between higher- and lower-emission alternatives; and (2) are widely recognised as having a large influence on an individual's carbon footprint (i.e. the total amount of greenhouse gases, including carbon dioxide and others, that are generated directly or indirectly by their actions; Pandey et al., 2011). Hence, our focus is on travel and dietary choices (e.g. Wynes and Nicholas, 2017). It is important to note, however, that we do not take a binary 'acceptable-or-not' approach to these behaviours. We do not seek to understand reasons for not living car-free or switching to a vegan diet, but rather perceived difficulties in reducing reliance on private vehicles or high-emission food consumption, particularly among those who perceive a benefit in reducing their carbon footprint.

Before continuing, it is worth discussing the importance (and limits) of individual behaviour change (Whitmarsh et al., 2021). It can be uncomfortable to believe that individual behaviour change is necessary for reducing greenhouse gas emissions and preventing the worst effects of climate change. Scepticism is easy where behaviour change is conceptualised with a narrow focus on relatively low-impact behaviours (e.g. recycling), where reductive frames are used (e.g. what difference does buying a ticket make – the flight is going anyway?), or where responsibility is deflected elsewhere (e.g. to shareholders of oil companies). These arguments are perhaps particularly appealing in countries with relatively low populations, like Ireland. As the above-cited surveys show, however, the majority of the Irish public

are not climate sceptics, nor do they renounce responsibility for taking action. That said, a sole focus on trying to change individual behaviour is unlikely to be helpful for securing necessary systematic change (Chater and Loewenstein, 2023). Behaviour change alone will not be sufficient for reducing emissions without corresponding (and probably greater) changes to public infrastructure, policy systems and how businesses operate (Barr, 2018; Hinrichs, 2014; IPCC, 2023). It is thus helpful to consider the role of individual behaviour in conjunction with how larger systematic change occurs, for example through political participation, market demand, support for infrastructure change and shifting social norms (e.g. Whitmarsh et al., 2021). Moreover, individual behaviour change and systems change is not an 'either/or' choice; policies can incentivise large groups of individuals to change their behaviour and thus have larger-scale impacts. This focus on individual behaviour is particularly important for those living in developed nations, where patterns of consumption imply greater need for change (de Bruin and Yakut, 2022). For this report, our interest is in impediments to reductions in high-emission consumption that may be determined by the individual, the system or an interaction of both (see, for example, Geels and Schot, 2007).

In the remainder of this chapter, we present background information to contextualise Ireland's greenhouse gas emissions and the relative contribution of individual sectors. We then briefly outline the evidence for reducing emissions related to transport and food choices, including existing analyses of survey data on the public's travel behaviour and diet. We then describe how our approach differs from surveys run to date.

1.1 IRELAND'S GREENHOUSE GAS EMISSIONS

The European Union (EU) accounts for the third highest share of production-based global greenhouse gas emissions, after the United States and China (Crippa et al., 2022). Within the EU, Ireland's per person emissions are among the highest at 11.9 tonnes CO_2-eq per person (Environmental Protection Agency, 2023a). This figure is five times greater than the United Nation's (UN) global target for per-person emissions, which aims to represent each individual's 'fair share' (United Nations Environment Programme, 2020).

Ireland has relatively little heavy industry and an export-oriented agriculture sector. As such, by sector, agriculture contributes the most emissions (38.4 per cent) followed by transport (19.1 per cent), energy industries (16.6 per cent) and residential energy use (10.0 per cent) when traditional production-based emissions are calculated (Environmental Protection Agency, 2023b). Many sectors have begun to achieve slight reductions in emissions, due to increases in renewable energy for generation, high fuel prices, and reduced use of nitrogen fertiliser in agriculture. However, these declines are largely offset by increases in emissions in other sectors, most notably transport (which are rising since 2020 and approaching

pre-pandemic levels). Overall, emission reductions in 2022 fell far short of national and EU targets and almost all sectors are projected to exceed sectoral emissions ceilings for 2030 (Environmental Protection Agency, 2023c).

These shortfalls in emission reductions require rapid policy implementation, for example with accelerated delivery of renewable energy sources, supports to increase the energy efficiency of buildings, and re-foresting of land. The public can help in two broad ways: by supporting policy and by changing their own consumption of goods and services with high levels of emissions. Previous ESRI research shows that engaging with climate science can increase policy support (Timmons and Lunn, 2022). The focus of the present report is on everyday behaviour change. Our interest is in two everyday behaviours that are estimated to have the largest impact on an individual's carbon footprint: transport and food (e.g. Wynes and Nicholas, 2017).

1.2 TRANSPORT BEHAVIOUR

Reducing reliance on private vehicles for transport has multiple benefits. Most obviously, switching to machines that do not burn fossil fuels reduces CO_2 emissions. Reducing fuel emissions also improves air quality, decreasing public exposure to pollutants known to cause respiratory and cardiovascular problems, cancer, neurological decline and premature death (e.g. Carthy et al., 2020; Mac Domhnaill et al., 2021; Kampa and Castanas, 2008; Miner et al., 2024). Traffic reduction also leads to lower levels of noise pollution, which is associated with cardiovascular disease, other health complications and poorer quality of life (Mac Domhnaill et al., 2022; Münzel et al., 2021). Where private vehicle journeys are replaced with active travel, sustainable choices help to combat sedentary lifestyles, promoting better physical health (De Nazelle et al., 2011). Fewer cars on roads also means those who need to travel by car can do so more efficiently.

Multiple perspectives hence support the broad policy aim to reduce use of private vehicles. Ireland's Climate Action Plan (Government of Ireland, 2023) sets a target for transport emission reduction of 50 per cent by 2030. However, following the easing of pandemic restrictions and during a period of strong economic performance, emissions in the transport sector have increased year-on-year.

To date, much of the policy response has relied on financial incentives to change behaviour: basing tax systems on vehicle CO_2 emissions, a carbon tax on fuel and the provision of grants to purchase electric vehicles (Department of Transport, 2023). The Climate Action Plan (Government of Ireland, 2023) complements these measures through an 'Avoid-Shift-Improve' approach (ibid). For example, public transport fares were reduced by an average of 20 per cent in 2022 (Department of Transport, 2022). The plan proposes better land-use planning to reduce the need

for travel, investing in public transport and active travel infrastructure to encourage modal shifts and promoting greater uptake of electric vehicles to improve the energy efficiency of road transport. Behaviour change is thus at the core of the policy response to growing transport emissions.

Changing behaviour effectively requires in-depth understanding of its drivers, enablers and impediments to efficiently target interventions (Lunn, 2019). Hence it is crucial to measure how the public currently engage with transport systems and what might prevent change. On the former question, relevant data are available. The National Travel Survey run by the Central Statistics Office (2020) and the National Household Travel Survey run by the National Transport Authority (2018) both demonstrate high reliance on private vehicles, with around three-in-four journeys taken by car and many of these covering relatively short distances (less than 2 kilometres). At least some of these journeys could probably be taken via alternative means.

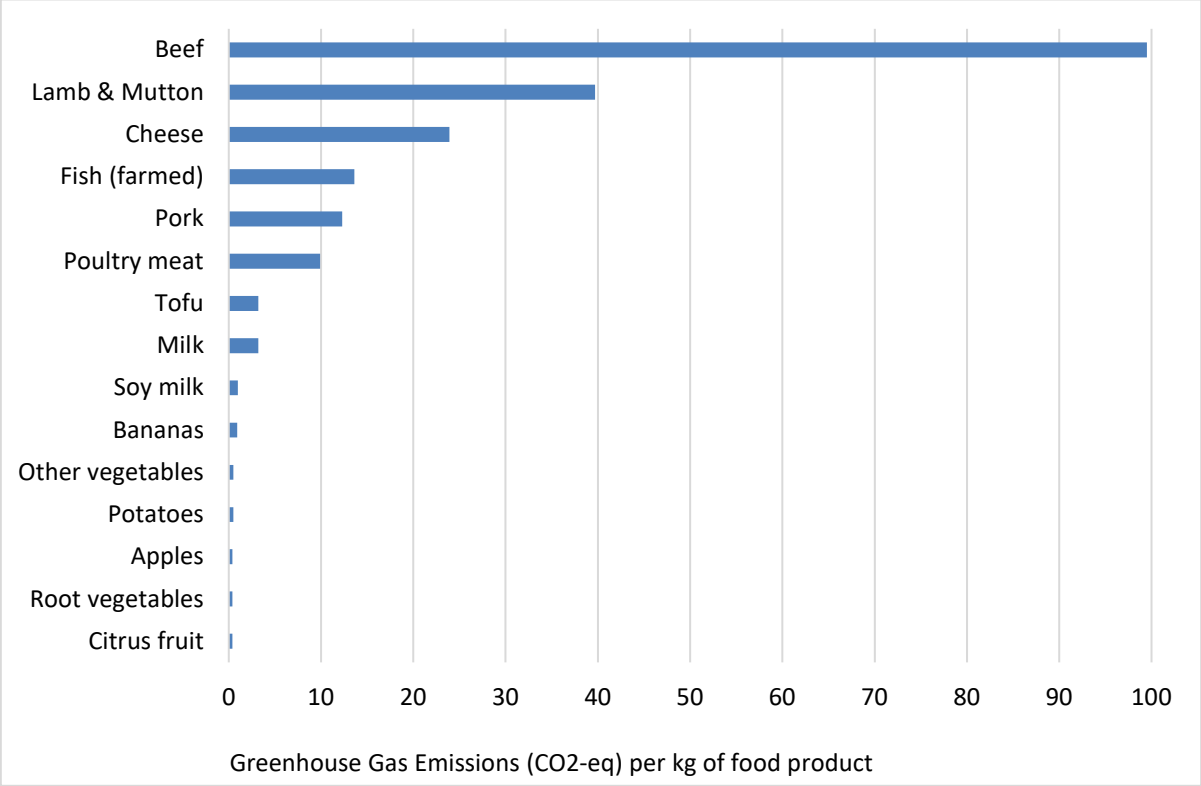
There are multiple potential explanations for over-reliance on private vehicles. Perhaps the public fail to associate travelling by car with producing greenhouse gas emissions (Timmons and Lunn, 2022). Alternatively, there may be demand for change that is inhibited by a lack of infrastructure or reliable alternatives (Brand et al., 2021). Personal reasons, such as a preference for driving or perceived convenience, may further explain some over-reliance (Ferreira et al., 2022). However, to date no data have been collected on public experience or perceptions of factors that prevent reductions in private vehicle usage. Our aim is to measure to what extent the public are cognisant of the emissions-impact of driving, their willingness to change their behaviour and, among those willing to change, perceptions of what impedes change.

1.3 FOOD

Our second behaviour of interest is food choice. Although each stage of food production is associated with emissions, farm-based processes contribute far more than other stages (Ritchie et al., 2023). For example, global supply chain emissions, including packaging, transport processing and retail, account for just 18 per cent of emissions from food production (Ritchie, 2019). This means that, broadly speaking, choice of what to eat – and particularly choice of protein – is a large determinant of an individual's carbon footprint, more so than other features such as where it is produced. Ruminant livestock are the largest source of farm-based greenhouse gas emissions. While methane emitted by cows and sheep as they digest grass and plants persists in the atmosphere for a shorter time than CO_2, its warming impact is 25 times greater over a 100-year timescale (Boucher et al., 2009). Other sources of agricultural emissions are nitrogen-based fertilisers, storing and spreading of

manure and on-farm machinery[1] (Leip et al., 2015). Life-cycle assessments (i.e. including the growing, processing, transportation, packaging and disposal) of different types of food show that red meat (i.e. beef, lamb) and cheese contain an order of magnitude more embedded greenhouse gas emissions per kilogramme of food (or per 100 grammes of protein or per 1,000 kilocalories) than plant-based foods (Ritchie et al., 2023; Figure 1.1).

FIGURE 1.1 GREENHOUSE GAS EMISSIONS OF FOOD TYPES (GLOBAL ESTIMATES)



Source: OurWorldinData.org
Note: These data represent global estimates of life-cycle impacts, including processing and transport. At the time of writing, similar data for food produced in Ireland were not available. Data from a 2010 analysis by the EU's Joint Research Centre are presented in Appendix A and show that, although greenhouse gas emissions caused by Irish beef are far lower than the global average, relative contributions appear similar. For example, emissions from beef produced in Ireland (excluding transport emissions) are far greater than international estimates for plant-based foods (which include transport emissions) (Weiss and Leip, 2012).

From an environmental perspective, reducing demand for red meat is thus a sensible policy aim. However, unlike transport, the health implications for individuals are less straightforward (Garnett, 2011). On the one hand, red meat has high bioavailability of essential macro- and micro-nutrients, such as protein, iron and vitamin B12 (De Smet and Vossen, 2016). On the other, it is also high in saturated fat and has been classified as 'probably carcinogenic' (Farvid et al., 2021; McAfee et al., 2010). Health advice is to consume red meat as part of a 'healthy, balanced diet' (Health Service Executive, 2023). The ambiguity of this advice likely

[1] Use of land that could otherwise hold carbon-sequestering forests is sometimes considered as a source of farm-based emissions, although on-farm sequestration is seldom considered in emissions calculations. We thank to a reviewer for bringing this point to our attention.

makes it difficult for people to determine how much they should eat. Current HSE guidelines are to consume two portions[2] of protein per day from a variety of sources, including lean red meat, fish, poultry, eggs, nuts and beans. From a health perspective, there are no specific guidelines for how much red meat is too much or too little for an individual to consume; both never eating red meat or doing so every day fit within these recommendations.

Greater specificity is provided by the EAT-*Lancet* Commission's 'Planetary Health Diet', which was developed by an international team of experts to help reduce the risk of poor diets and environmental degradation (Willett et al., 2019). The aim of the diet is to provide flexible guidelines about what to eat in a way that increases consumption of healthy foods (e.g. vegetables, whole grains, legumes) and decreases consumption of unhealthy foods (e.g. sugar, refined grains), while promoting sustainable food systems. EAT-*Lancet*'s guideline for red meat consumption (including beef, lamb and pork) is to consume no more than 98 grammes per week (i.e. the equivalent of about three rashers of bacon).

To identify scope for behaviour change that is both environmentally beneficial and good for human health, it is first necessary to determine whether the Irish public consume more than this 'healthy' portion of high-emission foods per week. Using data from the 2010 National Adult Nutrition Survey (NANS), Hyland et al. (2017) estimate an average weekly intake of 329g of red meat per week – more than three times the EAT-*Lancet* recommendation. More recent data from the Meat Supply Balance dataset suggests the figure may be as high as 423g per week[3] (Central Statistics Office, 2023). Using the NANS dataset, Williams et al. (2020, p. 33) find that the typical diet in Ireland is 'one rich in cereals, dairy, red meat and convenience foods'. These analyses show that, despite accounting for only 4 per cent of caloric intake, red meat accounts for 22 per cent of diet-embedded greenhouse gas emissions. This share is almost twice that of the next largest food category (dairy, at 12 per cent) which has a more balanced emissions-to-energy intake ratio (12:11; Hyland et al., 2017). Williams et al. (2020) show that shifting towards the Planetary Health Diet would improve the nutrient density of food consumed in Ireland, reduce diet-associated greenhouse gas emissions by more than half and save consumers money. Others have estimated a 26 per cent reduction in agricultural emissions in Ireland through adoption of the Planetary Health Diet (Geibel and Freund, 2023). Hence, on balance, reducing red meat intake among those who consume high levels appears to be a reasonable goal to reduce environmental impact in a healthy and cost-effective way (Westhoek et al., 2014).

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2 50g to 75g of meat / 100g of fish, soya or tofu / three-quarters of a cup of beans or lentils / two eggs / 40g of unsalted nuts or seeds.

3 Based on total meat consumption of 92kg per year, of which 24 per cent is comprised of red meat.

What might prevent reducing red meat intake, given these environmental, health and individual economic benefits? There are fewer systems-level barriers to change than with transport. However, previous ESRI research shows the public hold misconceptions about the sources of diet-embedded emissions. As noted above, the type of food matters far more than how it is produced or transported. For example, locally produced food sometimes has a higher carbon footprint than imported food. Gren et al. (2019) assessed the total greenhouse gas emissions associated with tomatoes sold in Sweden that were locally grown or imported from Spain. Results showed that imported tomatoes have a far lower environmental impact, even accounting for transport emissions, due to the energy-requirements of growing tomatoes in Sweden. Similarly, Saunders et al. (2006) show that Welsh-reared lamb for sale in the UK market had a far higher carbon footprint than lamb imported from New Zealand, due to differences in farming practices. However, the public in Ireland vastly underestimate the beneficial environmental impact of eating a plant-based diet and overestimate the impacts of other food choices, such as buying organic or local food (Andersson et al., 2022; O' Mahony et al., 2024; Timmons and Lunn, 2022). Our aim was to measure to what extent the public think about the emissions impact of food, their willingness to change their behaviour and, among those willing to change who have not yet done so, what impediments to change they perceive.

1.4 BEHAVIOUR CHANGE

To motivate our approach to measuring inhibitors of behaviour change, we refer to existing theoretical frameworks of behaviour change. Social Cognitive Theory proposes that behaviour is determined by personal factors (e.g. motivation) and environmental factors (e.g. the context in which the behaviour occurs) (Bandura, 1989). The Theory of Planned Behaviour claims that behaviour depends on intentions, which are determined by attitudes, social norms and perceived behavioural control (i.e. an individual's belief in their ability to carry out the behaviour of interest) (Ajzen, 1991). The Value-Belief-Norm theory proposed that pro-environmental behaviour is influenced by an individual's personal values, their beliefs about the consequences of their actions and perceived social norms (Stern et al., 1999). The Stage of Change Model defines behaviour change as a process of multiple stages, from (1) lacking awareness of the need to change, to (2) having awareness of the need but perceiving costs to outweigh benefits, (3) holding an intention, (4) taking initial action and (5) maintaining the new behaviour (Prochaska et al., 1998). The Capability-Opportunity-Motivation Behaviour (COM-B) Model claims that individuals need to have the psychological and physical ability to perform the desired behaviour, be in an environment that offers supporting external factors and have the desire to engage in the action (Michie et al., 2011).

While there are differences between each of these behaviour change models, some psychological variables are common. First, each model explicitly defines or implicitly assumes a required level of *awareness* that current behaviour is problematic. Second, each notes the necessity of holding *attitudes* that align with the goal of the desired behaviour (e.g. that it is important to reduce greenhouse gas emissions). Third, the models emphasise the importance of a facilitatory *environment* or high level of control over the behaviour of interest in order to bring about change. Since recent research demonstrates the prevalence of pro-climate attitudes in Ireland, our focus is on the first and third variables (awareness and situational factors).[4]

1.5 AIMS AND APPROACH

In order to identify impediments to change, it is important to measure current transport and food behaviours. Hence our first objective was to update descriptive statistics on relevant behaviour frequency and any changes already made by individuals to reduce their carbon footprint. We do so using standard survey questions of typical weekly behaviour. Our primary objectives, however, were to measure awareness of the environmental impact of behaviours of interest and record perceived difficulties with change.

For these objectives, the approach we take is different to other surveys of climate-relevant behaviours and attitudes. Whereas most research to date has relied on close-ended questions or qualitative data from small focus groups, we elicited qualitative data from a large, nationally representative sample of the adult population on behaviour awareness and what difficulties they perceived as impeding change. Participants were incentivised to list in open-text questions those behaviours that they thought 'mattered most'[5] for their carbon footprint. They were also asked to list reasons why changing their transport and food behaviour might be difficult (to promote honesty these responses were voluntary and not incentivised). The advantage of open-text questions is that responses were not constrained or prompted by pre-set options, which could have biased the findings (Ferrario and Stantcheva, 2022). For example, multiple choice questions with options for various behaviours could prime participants to select options they would not have otherwise considered or to omit options they considered important but that did not feature in the list. If people only recognise the emissions impact of driving when prompted with it as an option, standard survey questions could lead to overestimates of the awareness of driving's environmental impact.

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4 Social norms (i.e. beliefs about shared standards of acceptable behaviour) are proposed as influential of behaviour change in many models but are not a necessary factor in all and hence are not of primary focus in this report. Perceived norms in Ireland are recorded elsewhere (e.g. Leiserowitz et al., 2021).

5 Our choice of wording here was deliberate. We opted to use a phrase that is colloquially meaningful while also allowing participants to generate positive and negative environmental behaviours (e.g. they could say they ate a plant-based dinner instead of a meat-based one, or that they drove a long distance instead of taking the train).

However, if people mention driving in an open-ended question, we can be confident that the public are aware of its impact. Similarly, if people believe not littering has a large effect on their carbon footprint but it does not feature in the pre-set option list, scope for addressing this misconception will be missed. Hence, the survey did not test mere recognition of behaviours and perceived difficulty of behaviour change but instead measured ones that are spontaneously generated by the public.

The remainder of this report describes the method employed and sample recruited in more detail (Chapter 2); the results, including differences between socio-demographic subgroups (Chapter 3); and their implications (Chapter 4).

CHAPTER 2

Method

The study was hosted online using Gorilla and was laptop, tablet and mobile compatible (Anwyl-Irvine et al., 2020). The full study contained multiple stages, but here we report findings from stages that recorded participants' thoughts about their day-to-day behaviour and what difficulties they perceived to changing how they get around and what they eat. Other stages set out to measure other research questions and are thus reported separately. As the study involved primary data collection with non-vulnerable adults on topics other than health and sensitive issues, the requirement for approval by the ESRI Research Ethics Committee was waived.

2.1 PARTICIPANTS

One thousand two hundred participants aged 18 and over were recruited to be broadly nationally representative using quota sampling (by age, gender, region and social grade)[6] from online panels held by two leading market research and polling agencies.[7,8] Participants were paid €4 for completing this study and one of two others (800 also completed a study on environmental risks and the other 400 also completed a study on active travel infrastructure, in both cases after the study reported here). Some tasks (described below) were further incentivised, with correct responses earning additional entries into a raffle for one of three €100 Mastercard vouchers. Together the studies took 20 minutes to complete on average. Data collection ran between 5 and 19 September 2023.

In line with best practice, we pre-registered the study,[9] employed mid-survey attention checks and analysed response quality post data collection. Data collection continued until a final sample of 1,200 was achieved. The attention check was an instructed response question and was failed by 38 respondents, who were automatically excluded from the study and thus did not form part of the final 1,200. An additional 298 participants started the study but did not complete it and also did not form part of the final 1,200. Most of these (189, 63 per cent) dropped out on the first task, which asked them to write about the previous day, before it was clear the study was about climate change. The remainder were distributed

6 Social grade is a demographic classification system routinely used in market research as a proxy for socioeconomic status. Respondents choose a category based on the occupational level of their household's chief income earner (e.g. junior managerial, skilled manual worker, casual worker).

7 https://www.redcresearch.ie/product/red-c-live/ and https://banda.ie/services/acumen-panel/.

8 For a detailed discussion on the pros and cons of this sampling method, see Chapter 2 in Ó Ceallaigh et al. (2023).

9 https://osf.io/7q5ak/.

evenly throughout the study.[10] Hence, total attrition among those who started the study was 21.9 per cent (336 out of a total 1,536 who began the study), with consistent attrition across panels. This is higher than the research team usually encounters for online studies undertaken by this recruitment method, but can be attributed to the involved nature of the study (i.e. the requirement to write rather than simply respond to simple survey questions), and not the subject matter (i.e. climate change). Of those who completed the study, no participant reported any issues with using their data in open texts recorded at the end.

The socio-demographic characteristics of the final sample are presented in Table 2.1. Descriptive analyses reported in Chapter 3 are weighted by participant age, gender, educational attainment and living in an urban or rural area,[11] based on population estimates from the 2022 Census. We used iterative proportional fitting ('raking'), with weights restricted between 0.5 and 2. Weighting had greater impact on educational attainment and living area than gender and age because the former were not used in the quotas set by the market research agency.

TABLE 2.1 PARTICIPANT CHARACTERISTICS

		Sample – Unweighted	Sample – Weighted	CSO Estimate
Gender	Men	48.7	49.0	49.0
	Women	51.1	51.0	51.0
	Non-binary/Other	0.3	0.0	-
Age	18-39 years	36.5	36.9	36.8
	40-59 years	36.8	36.5	36.5
	60+ years	26.8	26.7	26.7
Educational Attainment	Leaving Certificate or below	33.4	43.9	43.9
	Tertiary Education below degree	29.0	28.6	28.6
	Degree or above	37.6	27.5	27.5
Living Area	Urban	62.4	68.6	68.6
	Rural	37.6	31.4	31.4

Source: Authors' analysis and CSO (2019; 2023).
Note: Unfortunately, the Census does not record non-binary as a gender. While accepting legitimacy of non-binary identities, for weighting, we follow the CSO's method of assigning gender at random to those who report anything other than male or female (n = 3). The discrepancy between the CSO estimate and our unweighted sample with respect to educational attainment is due to the use of social grade instead of education in the quota sampling applied by the market research agency.

10 As exiting the survey is the primary mechanism for withdrawing consent for data processing, we do not have access to data among those who dropped out of the study and thus cannot test for differences across socio-demographic subgroups.

11 Note that we use educational attainment for weighting despite basing quotas on social grade. This is because market research agencies do not use educational attainment for quotas, but population estimates for social grade are not available. Urban-rural estimates are based on 2019 data due to changes in classification systems used in Census 2022.

2.2 MATERIALS AND DESIGN

Full materials are available in Appendix B and on the project's Open Science Framework page (https://osf.io/7q5ak/). Participants were first informed that the study was about everyday behaviour; it was not evident that environmental behaviour was the focus of the study until after the first task. It was not possible for participants to return to previous pages of the survey. The first task was a diary task using the Day Reconstruction Method (Kahneman et al., 2004). Participants were instructed to think about their day as a series of episodes and were presented with three text boxes to describe what they did in the morning, afternoon and evening the day before completing the study. The purpose of this task was to aid recall for the subsequent questions (Lunn et al., 2024).

On the next page, participants were asked to identify the things they did during the previous day that mattered most for their carbon footprint, defined as their total emissions of carbon dioxide and other greenhouse gases from the actions they took or products they bought. Participants were reshown their diary entries on this page and were informed that they could write about anything they did, even if they had not mentioned it in the diary task. This question was first piloted with a nationally representative sample (N = 800) to refine question wording and to develop a framework for qualitative coding of responses. Participants were presented with three open text boxes but could add up to seven more or select that they couldn't think of anything. Responses to this task were incentivised. For each additional environmental behaviour listed, participants earned an extra entry to the raffle.[12]

Follow-up questions then probed behaviours of interest that participants did the previous day. They were reshown their morning, afternoon and evening diary entries and asked if, during each of these periods, they had gone from one place to another or had eaten a meal or snack. For participants who had gone somewhere, they were asked to select which modes of transport they used (private car or motorcycle – as a driver or passenger – bus, train or Luas, taxi, bike, scooter, walking, other). Those who travelled by private vehicle (including taxi) were asked about the length of the shortest full journey they made. For those who had eaten something, they were asked to select from a list whether they had consumed any of six foods: milk or butter, eggs, cheese, beef or lamb, other meat (e.g. pork, chicken, game), and fish and seafood.

Participants were then asked about their general transport and diet behaviour, in counterbalanced order. For transport, participants were asked what type of private vehicle they primarily drive (if any) and on how many days per week they travel by

[12] Incentives were awarded based on any attempt to list an environment-related behaviour.

each of the following for at least one journey: private vehicle (even as a passenger); bicycle or scooter; by walking or by wheelchair; and by public transport. They were asked whether they had ever made changes to how they get around 'to reduce their carbon footprint'. If so, they were asked what those changes were and how they feel about them, otherwise they were asked how they feel about their current transport behaviour and whether they intended to make future changes. For diet they were asked how often they eat beef or lamb, other meat, fish and seafood. They were also asked whether they had made changes to their diet 'to reduce their carbon footprint' and, if so, what those changes were and how they feel about them. If they had not made changes, they were asked how they feel about their current diet and whether they intended to make future changes.

For both behaviours, participants who would like to make changes or had made changes they found (or are finding) difficult to maintain were asked to write why changes are or were difficult for them, and were presented with three open text boxes to give their responses. Importantly, additional responses to these questions were not incentivised. As such, the data collected on perceived difficulties to behaviour change should be viewed as voluntary contributions by participants motivated to reduce their carbon footprint with no external demand to do so.

At the end of the study participants completed standard socio-demographic questions and indicated whether they experienced any issues with the study.

CHAPTER 3

Results

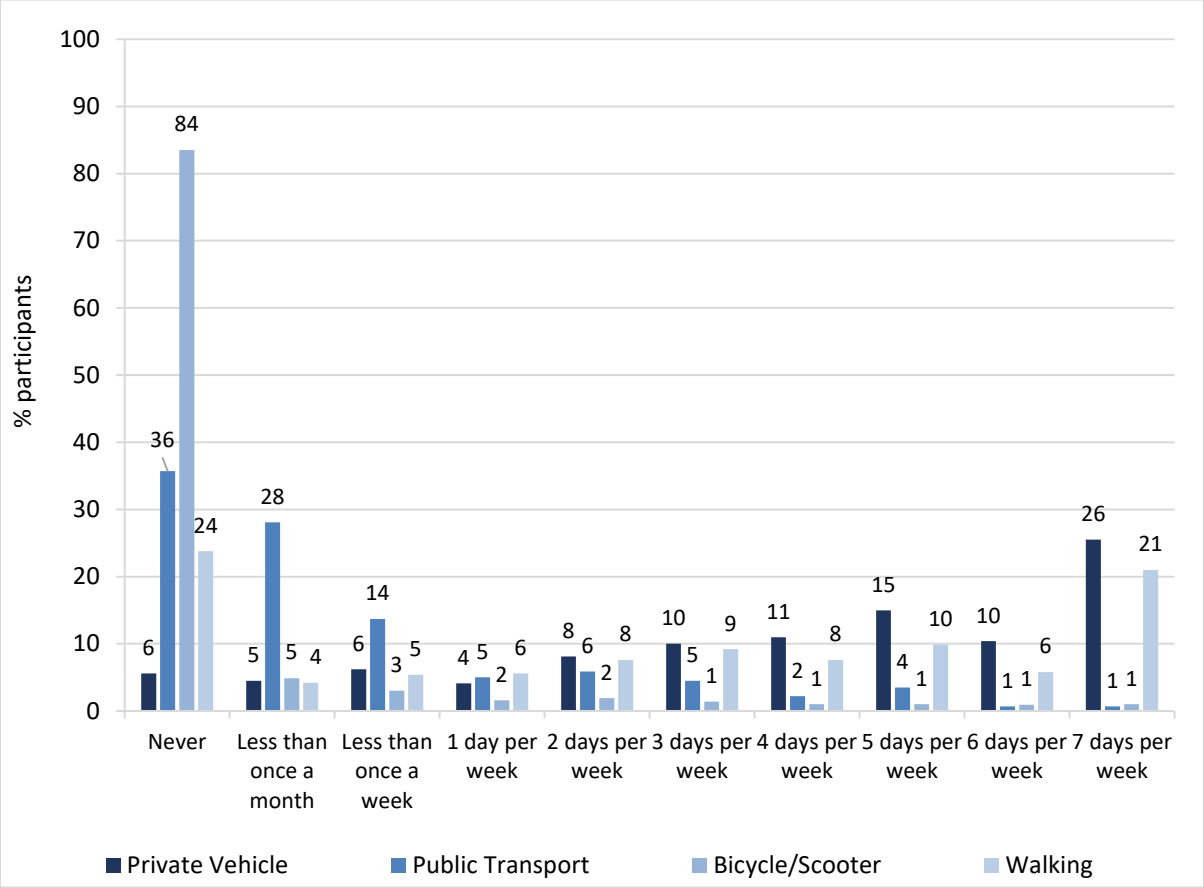
In this chapter, we report responses to questions about the public's everyday transport and food behaviour in general. We then present the behaviours identified by participants as making the largest difference for their personal carbon footprint the day before they took the survey. We then summarise the changes some of the public report making to their transport and food behaviour before describing difficulties to behaviour change identified by the public. Within each section, we report first on transport behaviour and then food behaviour. For interpretability with respect to descriptive statistics, we report weighted percentages that are otherwise unadjusted (i.e. we do not report predicted probabilities from models).

3.1 EVERYDAY BEHAVIOUR

3.1.1 Everyday behaviour – transport

The majority (81.2 per cent) of participants reported having a car, with motorists split relatively evenly between primarily driving a diesel (47.4 per cent) or petrol (42.7 per cent) car. The remainder of motorists (9.9 per cent) primarily drive a hybrid or electric car. Figure 3.1 shows how often participants reported travelling by various modes of everyday transport: private vehicle (as a driver or passenger), by bicycle or scooter, walking (or by wheelchair) and by public transport. The modal response for travelling by private vehicle was seven days per week (25.5 per cent), whereas the modal response for all other modes of transport was never (83.5 per cent for cycling, 35.7 per cent for public transport and 23.8 per cent for walking). Half of participants (50.6 per cent) reported travelling by private vehicle five or more days per week. Less than 10 per cent of the population reported travelling by bicycle or scooter at least once per week.

FIGURE 3.1 FREQUENCY OF TRANSPORT MODES (WEIGHTED)



Sources: Authors' analysis.

To test for socio-demographic differences in travel modes, we model private vehicle frequency using an ordinal logistic regression and we model all other modes using a logistic regression that predicts use of that mode at least once per week (Table 3.2). We include gender, age, educational attainment, employment status, living area, region, country of birth and having a child under the age of 18 living in their home as predictors. The models reveal striking differences in travel mode by socio-demographic groups.

To illustrate effect sizes where significant differences are observed, we compare those who travel by private vehicle five or more days per week to those who drive less often, and for other modes those who travel by that means at least once per week (Figure 3.2).

Unsurprisingly, some of the largest differences in private vehicle use relate to where people live. Those living in Dublin and in urban areas travel less often by private vehicle compared to those living outside of Dublin (a 22 percentage-point difference) and in rural areas (16 percentage points). Having a child at home is associated with more frequent private vehicle use (18 percentage points). Being

aged above 40 (14 percentage points greater than those below 40) and working (19 percentage points higher than those not working) are also associated with more frequent private vehicle use.

Turning to public transport use, most of the differences reflect the converse of the above. Again, the largest differences are observed with respect to living area, with those in Dublin more likely to use public transport at least once a week compared to outside of Dublin (30 percentage points) and those in urban areas 20 percentage points more likely to use public transport at least once per week compared to those in rural areas. Younger adults (below 40) are significantly more likely (19 percentage points) to use public transport than those aged 40 to 60 years. Those with a degree are also more likely to travel by public transport than those without (12 percentage points). Those with a child at home are 9 percentage points less likely to travel by public transport at least once per week.

On cycling, we replicate the well-established gender gap, with 12.5 per cent of men cycling at least once per week compared to 4.9 per cent of women. We also see cycling differences by age, with older adults less likely to cycle than those aged under 40 (about a 7 percentage-point difference), and by place of birth, with those born outside of Ireland more likely to cycle than those born in Ireland (3 percentage points).

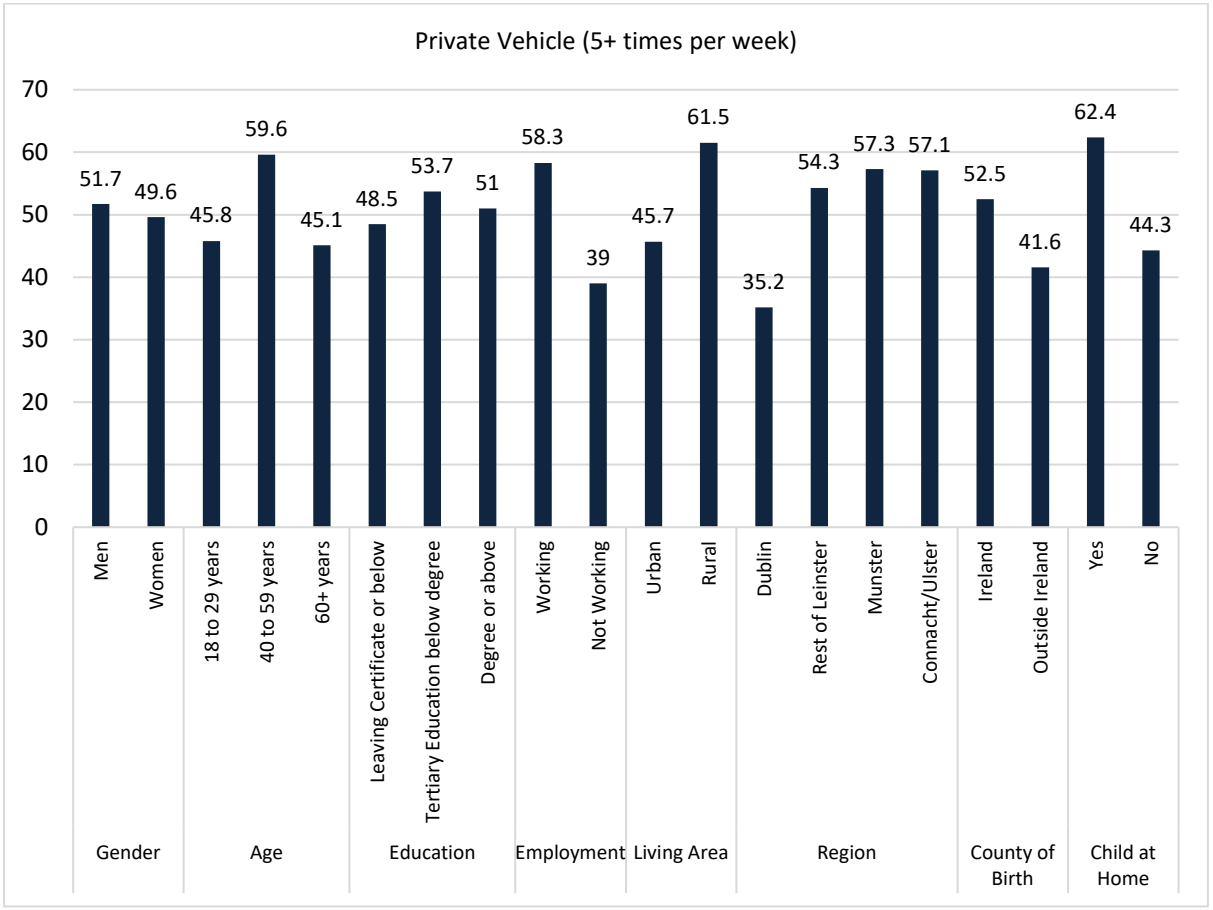
TABLE 3.1 REGRESSION MODELS PREDICTING EVERYDAY TRANSPORT MODES

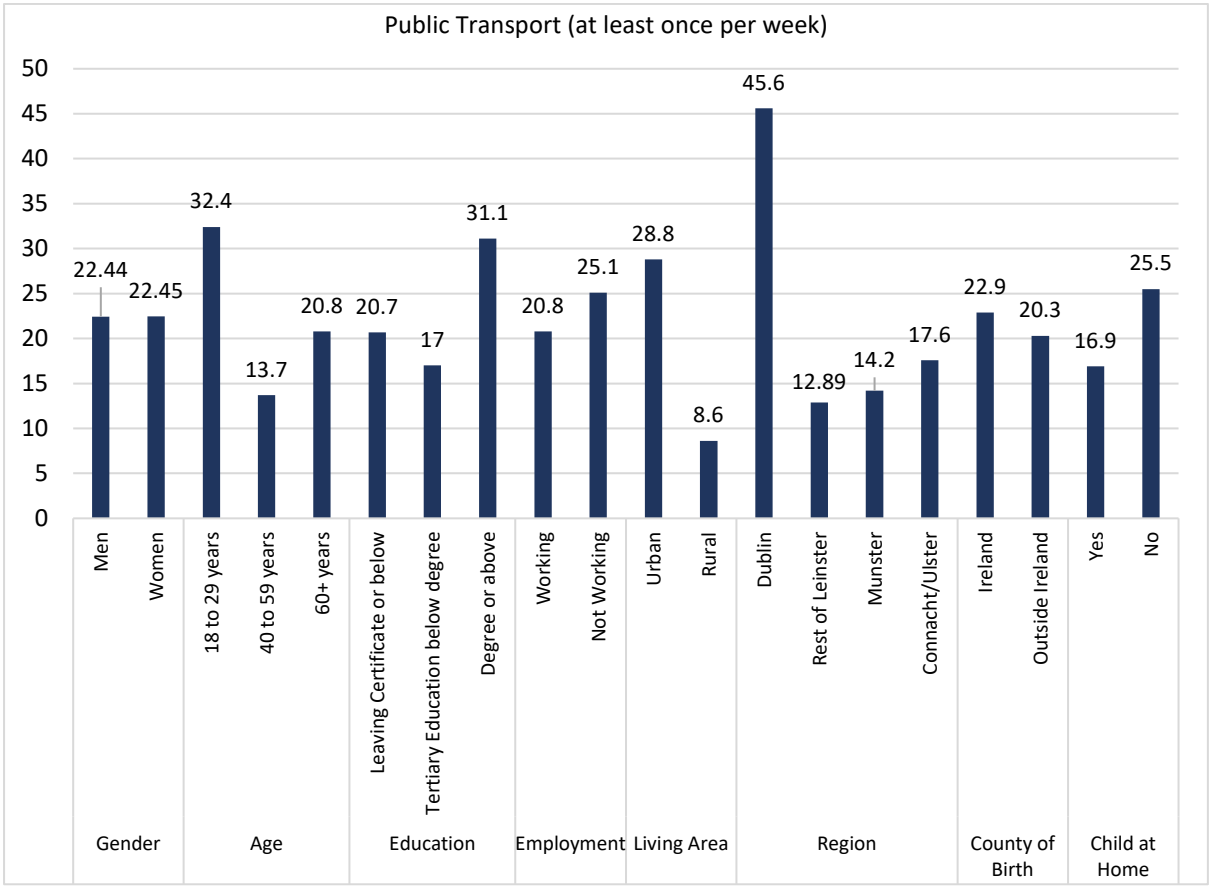
		Private Vehicle	Public Transport	Cycling	Walking
Gender *(Ref: Woman)*	Man	0.04 (0.11)	-0.13 (0.16)	0.93*** (0.23)	-0.10 (0.13)
Age *(Ref: 18 – 29 years)*	40-59 years	0.53*** (0.13)	-0.87*** (0.19)	-0.63* (0.26)	-0.15 (0.15)
	60+ years	0.73** (0.15)	-0.88** (0.23)	-0.57† (0.31)	-0.03 (0.19)
Educational Attainment *(Ref: Leaving Certificate or below)*	Tertiary Education below degree	0.14 (0.13)	-0.26 (0.21)	0.34 (0.28)	0.12 (0.16)
	Degree or above	0.20 (0.13)	0.42* (0.20)	0.30 (0.27)	0.18 (0.16)
Employment Status *(Ref: Not working)*	Working (full- or part-time, incl. self-employed)	0.76*** (0.12)	-0.47* (0.19)	-0.05 (0.26)	-0.18 (0.15)
Living Area *(Ref: Rural)*	Urban	-0.46*** (0.12)	0.95*** (0.21)	0.42 (0.26)	0.99*** (0.14)
Region *(Ref: Dublin)*	Rest of Leinster	0.67*** (0.15)	-1.56*** (0.22)	-0.43 (0.29)	-0.54** (0.19)
	Munster	0.66*** (0.15)	-1.43*** (0.21)	-0.45 (0.29)	-0.19 (0.19)
	Connacht/Ulster	0.48*** (0.17)	-1.00*** (0.24)	-0.18 (0.32)	0.05 (0.22)
Country of Birth *(Ref: Outside Ireland)*	Ireland	0.70*** (0.14)	0.18 (0.21)	-0.57* (0.25)	0.01 (0.17)
Child at Home *(Ref: No)*	Yes	0.84*** (0.12)	-0.63** (0.19)	-0.01 (0.24)	-0.31* (0.14)
N		1,200	1,200	1,197	1,200

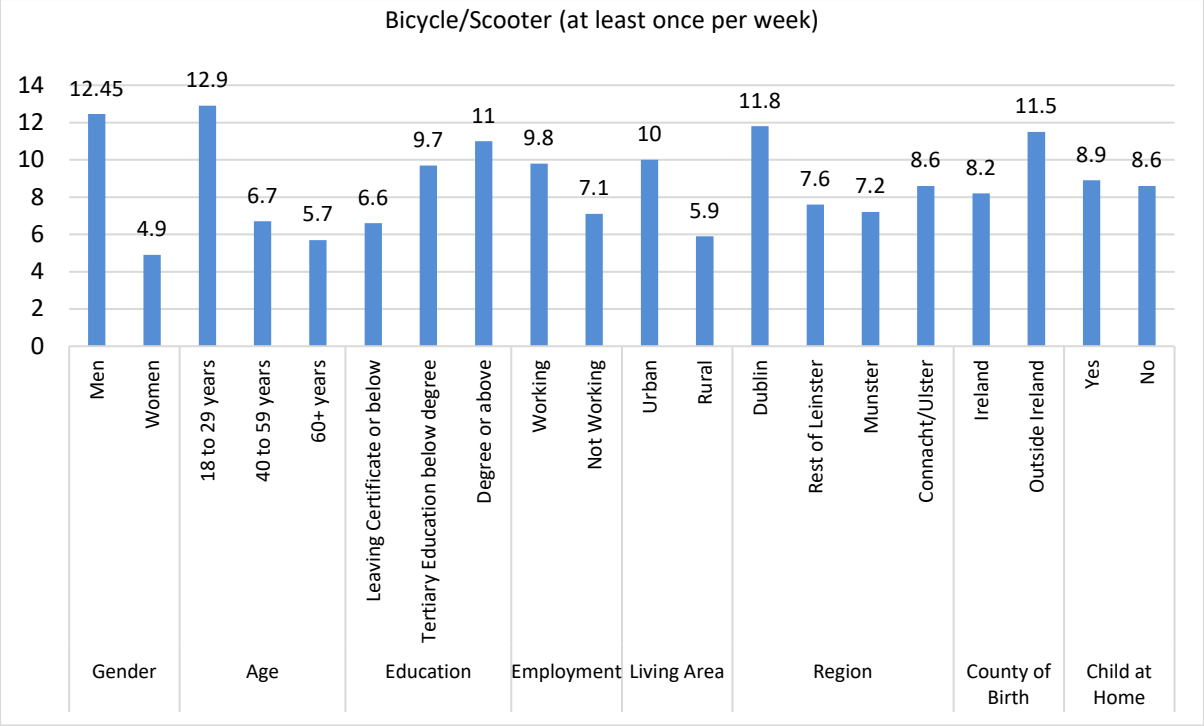
Source: Authors' analysis.

Note: †$p < .10$; *$p < .05$; **$p < .01$; ***$p < .001$. Private vehicle is modelled using an ordinal logistic regression with ten response categories (as in Figure 3.1) whereas others are logistic regressions. The public transport, cycling and walking models predict taking at least one journey week by that mode in a typical week. Total N is below 1,200 in models where all three non-binary individuals gave the same response (e.g. never cycling).

FIGURE 3.2 SOCIO-DEMOGRAPHIC DIFFERENCES IN TRAVEL MODES (WEIGHTED)



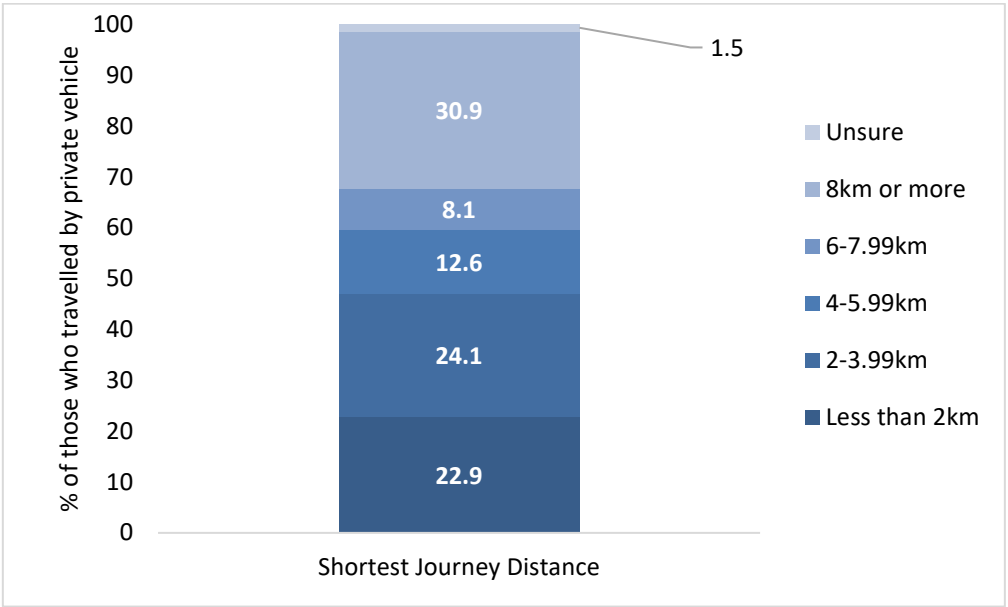




Sources: Authors' analysis.
Note: Percentages are weighted but otherwise unadjusted (i.e. they are not predicted probabilities).

Responses following the diary entry task provide insight into the kinds of distances travelled by those using private vehicles. Participants who travelled by private vehicle the previous day (n = 643) were asked about the shortest full journey (one-way) they made. Figure 3.3 shows that almost half reported a journey of less than 4km while close to one-quarter reported a journey of less than 2km (i.e. about a 25-minute walk or 12-minute cycle).

FIGURE 3.3 SHORTEST SINGLE JOURNEY DISTANCE (WEIGHTED)

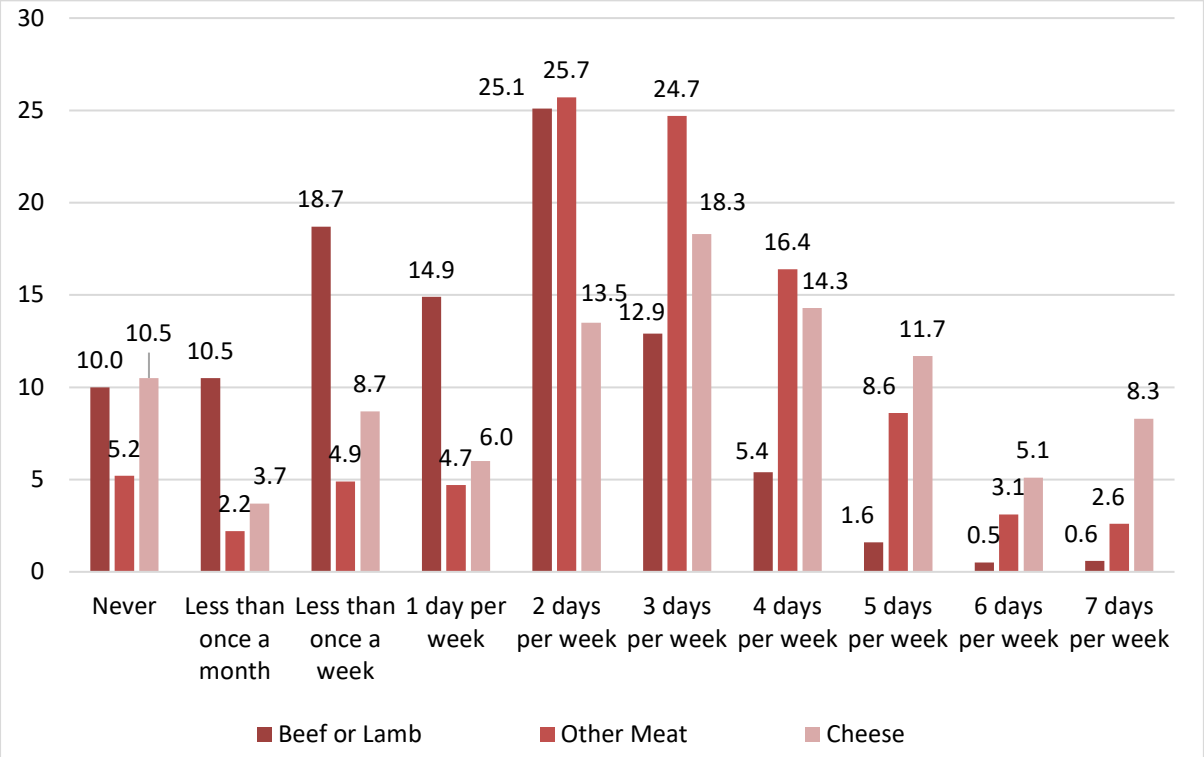


Sources: Authors' analysis.

3.1.2 Everyday behaviour – food

For diet, we focus on the highest impact foods: beef and lamb, other meat, and cheese. Figure 3.4 shows how often participants reported consuming each of these categories. Most (61 per cent) reported eating beef or lamb at least once per week, with a modal response of twice per week (25.1 per cent). The large majority (85.8 per cent) reported eating other meat at least once per week, most commonly two (25.7 per cent) or three (24.7 per cent) days a week. Over three-in-four (77.2 per cent) reported eating cheese at least once per week, with the largest group eating it three days in a typical week (18.3 per cent).

FIGURE 3.4 FREQUENCY OF HIGH-EMISSION FOOD CONSUMPTION (WEIGHTED)



Sources: Authors' analysis.

Table 3.2 presents ordinal regression models testing for socio-demographic differences in diet. To indicate effect sizes, we report here the proportion of those who consume meat beyond the recommendations set in the Planetary Health Diet,[13] beef or lamb more than once per week and other meat and cheese more than twice per week (Figure 3.5).

Overall, there are fewer and smaller differences by socio-demographic subgroup

[13] Note that here we assume that one day per week equates to about 100g of the relevant meat. As people may eat different types of meat more than once per day, or consume portions that are larger than standard guidelines, our approach should be considered conservative.

on food choice compared to transport choices. Men reported eating all forms of meat more often than women. Whereas 53.7 per cent of men eat beef or lamb more than once per week, the figure for women is 38.2 per cent. The difference is slightly less extreme for eating other meat more than twice per week: 60.3 per cent of men compared to 49.9 per cent of women.

The models also show age differences in diet. Although almost twice as many of those aged under 40 never eat beef or lamb than those aged over 60 (12.4 per cent vs 6.7 per cent, respectively, with 10 per cent of those aged 40 to 59 years), almost half of all age groups eat beef or lamb more than once per week (45 per cent of those aged under 60 and 48.8 per cent of those aged over 60). There is some suggestive evidence that the youngest age group may have substituted beef or lamb in their diet with other forms of meat: 61.1 per cent of those aged under 40 eat other meat more than twice per week, compared to 57.5 per cent of those aged 40 to 59 and 44.3 per cent of those over 60.

Those with higher educational attainment report eating beef or lamb more frequently, with half of those with tertiary level education (49.7 per cent below degree, 49.2 per cent above) doing so at least twice per week compared to 41.6 per cent of those with below tertiary-level education.

Compared to respondents born outside of Ireland, more of those born in Ireland report eating beef or lamb at least twice per week (46.5 per cent vs 43.4 per cent, although the difference is not statistically significant) and eating other meat at least three times per week (56.1 per cent vs 51.4 per cent).

People with a child in the home also report more frequent beef or lamb consumption (49.0 per cent vs 44.4 per cent). Notably, there is no evidence for a difference in diet between those living in urban and rural areas. There are few differences in consumption of cheese.

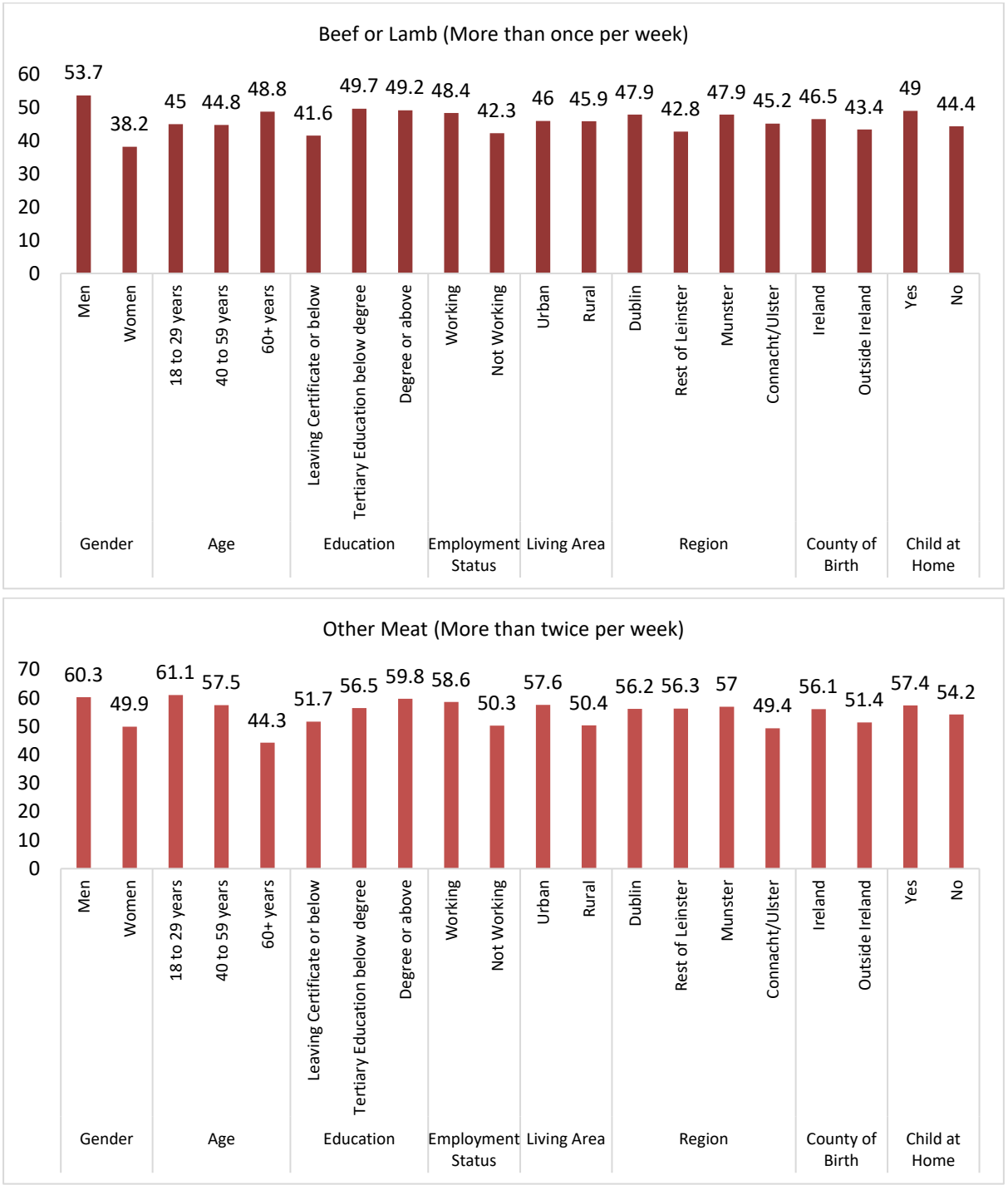
TABLE 3.2 REGRESSION MODELS PREDICTING HIGH-EMISSION FOOD CONSUMPTION

		Beef or Lamb	Other Meat	Cheese
Gender *(Ref: Woman)*	Man	0.70*** (0.11)	0.42*** (0.11)	-0.02 (0.10)
Age *(Ref: 18 – 29 years)*	40-59 years	-0.11 (0.12)	-0.18 (0.12)	-0.10 (0.12)
	60+ years	0.36* (0.15)	-0.70*** (0.15)	-0.29† (0.15)
Educational Attainment *(Ref: Leaving Certificate or below)*	Tertiary Education below degree	0.24† (0.13)	0.23† (0.13)	0.25† (0.13)
	Degree or above	0.27* (0.13)	0.11 (0.13)	0.11 (0.13)
Employment Status *(Ref: Not working)*	Working (full- or part-time, incl. self-employed)	0.17 (0.12)	0.02 (0.12)	-0.09 (0.12)
Living Area *(Ref: Rural)*	Urban	-0.10 (0.12)	0.18 (0.12)	-0.02 (0.11)
Region *(Ref: Dublin)*	Rest of Leinster	-0.12 (0.15)	0.37* (0.15)	0.02 (0.15)
	Munster	0.05 (0.15)	0.25† (0.15)	0.11 (0.15)
	Connacht/Ulster	-0.10 (0.17)	0.05 (0.17)	-0.03 (0.17)
Country of Birth *(Ref: Outside Ireland)*	Ireland	0.12 (0.14)	0.32* (0.14)	0.00 (0.13)
Child at Home *(Ref: No)*	Yes	0.34** (0.12)	0.00 (0.12)	0.20† (0.12)
N		1,200	1,200	1,200

Source: Authors' analysis.

Note: †$p < .10$; *$p < .05$; **$p < .01$; ***$p < .001$. For beef and lamb, low cell sizes at the upper end of the scale were combined to a '5 days or more' category. All models are ordinal logistic regressions. The same model with reported odds ratios is presented in Appendix C.

FIGURE 3.5 SOCIO-DEMOGRAPHIC DIFFERENCES IN HIGH-EMISSION FOOD CONSUMPTION (WEIGHTED)



Sources: Authors' analysis.
Note: Percentages are weighted but otherwise unadjusted (i.e. they are not predicted probabilities).

The patterns of everyday behaviour observed here imply scope for individual change to reduce greenhouse gas emissions. In particular, with half of people driving five or more days per week and many doing so over short distances, there appears to be scope for greater shifts towards active travel where opportunities exist, and it is safe to do so. Similarly, with almost half of adults eating beef or lamb more than once per week, there is a considerable gap between the diets reported

by the public and the Planetary Health Diet. Across both transport and diet behaviours, those likely to be higher earners (proxied by educational attainment), born in Ireland and with children in the home are identified as having the largest scope for reducing high emission behaviours.

3.2 BEHAVIOUR AWARENESS

After completing the diary task about their previous day, most participants (89.3 per cent) identified at least one behaviour that mattered for their carbon footprint. The majority (76.5 per cent) identified at least two and 58.8 per cent identified at least three. Very few (11.7 per cent) identified more than three. The resulting 2,997 behaviours were qualitatively coded by two independent raters (ST, YA) using a framework developed during the pilot study. Agreement was 95.9 per cent ($\kappa = .94$, $p < .001$), which is 'almost perfect' according to standard thresholds (McHugh, 2012). Disagreements were resolved through discussion to produce the final dataset.

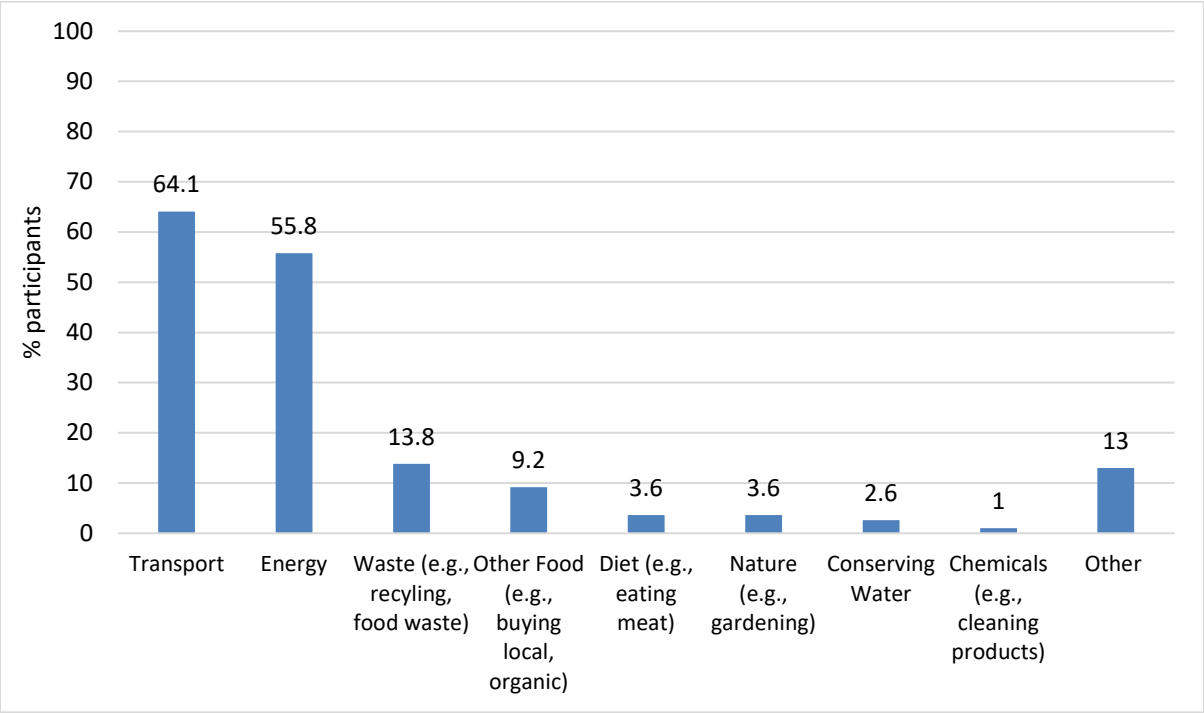
For reporting, we group the behaviours into nine broad categories (Table 3.3). These categories function to summarise the types of responses produced by respondents and are not reflective of all high-impact behaviours that could be generated. Figure 3.6 shows that almost two-thirds (64.1 per cent) of the sample mentioned transport-related behaviours and over half (55.8 per cent) mentioned energy consumption. A small minority (3.6 per cent) referred specifically to the type of food that they ate, with more than twice as many (9.2 per cent) mentioning lower-impact aspects of food choice, such as where it was sourced or how it was grown.

TABLE 3.3 BEHAVIOUR CATEGORIES

Category	Description	Example
Chemicals	Using or avoiding chemicals or cleaning products that have perceived environmental impact	*'Used deodorant after I showered'* *'When I used natural products for cleaning'*
Diet	Eating or avoiding meat, dairy, cheese or other animal products	*'Eating red meat for dinner'* *'When I used dairy in my cereal and coffee at breakfast'*
Energy	Using or avoiding electronic devices or appliances, home or water heating, showering or bathing (without specifying only water conservation concerns), making food, or general fuel references (e.g. gas)	*'When I washing clothes I hung them on the line outdoors to dry instead of using electric dryer'* *'Cooked dinner in oven'* *'Conscious use of electricity'*
Nature	Gardening and biodiversity concerns	*'Watered flowers that helped bees'*
Other Food	Any other reference to food that related to processes other than the type of food (e.g. organic, locally sourced, packaging) or did not specify a specific food	*'Choosing a local coffee shop that served locally roasted coffee'* *'When I bought fruit and vegetables that travelled halfway around the world…'* *'What I ate'*
Transport	Driving, commuting, using of public transport or functional (i.e. non-leisure) active travel	*'Carpooled to work'* *'Choosing to walk to and from work'* *'Was working driving my taxi'*
Waste	Actions relevant for the circular economy, such as recycling, using reusables, and other waste-related activities, such as composting, reducing food waste, etc.	*'The amount of paper I had to use'* *'When I cleaned the bathroom, I had bought new products… only used once and thrown out'*
Water	Specific references to wasting water or avoiding excessive water use	*'Not waste water while brushing'* *'I didn't leave the water running'*
Other	Entries that were too ambiguous to code, including possible leisure-related active travel or denial or that did not specify emissions source	*'When I went walking with my dog'* *'Housework'* *'I smoked cigarettes in public places'*

Source: Authors.

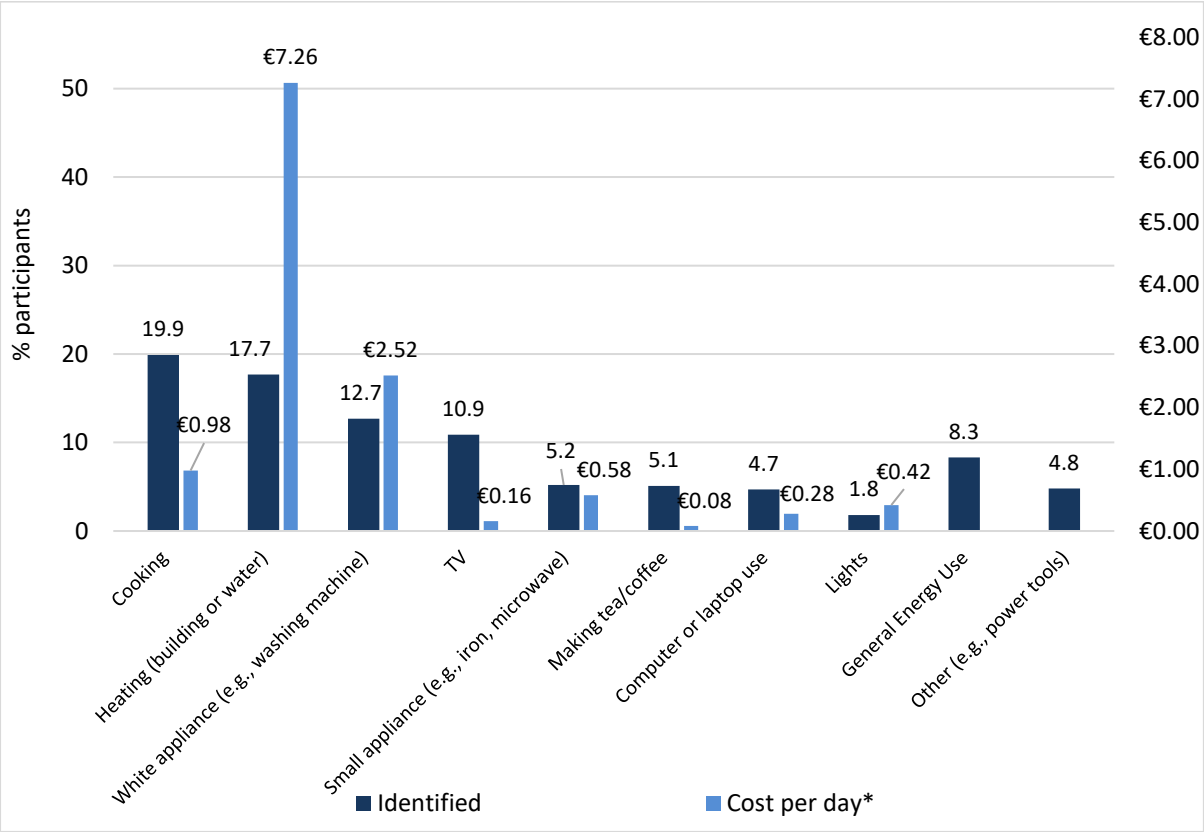
FIGURE 3.6 CARBON FOOTPRINT BEHAVIOURS IDENTIFIED (WEIGHTED)



Sources: Authors' analysis.
Note: Participants who generated multiple behaviours in one category are counted only once.

Given the variation in impact among behaviours within the energy category, we further present a breakdown of these behaviours. Figure 3.7 shows that cooking was the most commonly listed energy behaviour, by almost one-in-five people, followed by references to home or water heating. More than one-in-ten mentioned watching TV as one of the behaviours that mattered most for their carbon footprint, which is three times greater than those who referred to the food they ate. For comparison against actual energy use, Figure 3.7 also plots estimated cost per use of the categories used here. Costs are based on estimates from Bonkers.ie based on average daily use of typical appliances accessed at the time of writing (late 2023). The chart suggests inaccuracies in perceived impact of appliances compared to their actual consumption. For example, more people mentioned energy use from cooking as mattering for their carbon footprint than from heating their home or water, but we estimated heating to consume over seven times more energy than cooking. Similarly, 10.9 per cent of people mentioned watching TV as one of the actions that mattered most for their carbon footprint the previous day. If we take the estimates from Figure 3.7 to sum to a typical day's home energy use, TV would account for just 1 per cent.

FIGURE 3.7 CARBON FOOTPRINT ENERGY BEHAVIOURS (WEIGHTED)



Sources: Authors' analysis and Bonkers.ie (https://www.bonkers.ie/guides/gas-electricity/which-appliances-use-the-most-electricity/).

Note: Participants who generated multiple behaviours in one category are counted only once (e.g. one individual stating that they used an iron and used a microwave are counted only once in the small appliance category). *The secondary axis plots estimated cost per use of various appliances, based on calculations by Bonkers.ie. For exact appliance specification, see Bonkers.ie. Plotted estimates are based on the following: Cooking – one hour of oven use; Heating – three hours heating a three-bed home plus two hours to heat a 120-litre water tank; White appliance – one washing machine cycle, one dishwasher cycle, one hour use of tumble dryer plus one day running a fridge; TV – six hours running or two hours running plus the remainder of the day on standby; Small appliance – 30 minutes of ironing, ten minutes using microwave, five minutes using toaster plus 20 minutes of vacuuming; Making tea/coffee – five minutes of kettle use; Computer use – eight hours of laptop use plus a day running a router; Lights – three lights on for six hours.

Table 3.4 shows the results from models where the dependent variable is whether the participant identified one of the top five emission behaviours (transport, energy, waste, other food and diet), and the independent variables are socio-demographic characteristics (gender, age, educational attainment, working status, living area, nationality and having a child under the age of 18 at home). Broadly speaking, there were few differences in behaviour identification across socio-demographic groups. However, there were some differences in transport and diet identification. Those with the highest level of education attainment were more likely to report transport behaviours than those with below tertiary-level attainment (70.1 per cent vs 60.3 per cent) and more likely to report non-diet related food behaviours (e.g. buying local; 13.7 per cent vs 6.1 per cent). The only gender difference was observed with respect to waste, with more women identifying it than men (15.5 per cent vs 12.1 per cent). Notably, we again find no evidence for differences between those living in rural and urban areas.

TABLE 3.4 LOGISTIC REGRESSION MODELS PREDICTING BEHAVIOUR IDENTIFICATION

		Transport	Energy	Waste	Diet	Other Food
Gender *(Ref: Woman)*	Man	0.01 (0.13)	0.15 (0.12)	-0.50** (0.18)	-0.01 (0.33)	0.18 (0.21)
Age *(Ref: 18 – 29 years)*	40-59 years	0.03 (0.15)	-0.02 (0.14)	0.19 (0.20)	-0.48 (0.38)	-0.30 (0.25)
	60+ years	-0.01 (0.18)	0.29† (0.18)	0.12 (0.26)	-0.72 (0.48)	-0.25 (0.29)
Educational Attainment *(Ref: Leaving Certificate or below)*	Tertiary Education below degree	0.17 (0.16)	0.09 (0.15)	0.08 (0.27)	-0.16 (0.44)	0.65* (0.29)
	Degree or above	0.36* (0.15)	0.13 (0.15)	0.27 (0.21)	0.02 (0.41)	1.03*** (0.28)
Employment Status *(Ref: Not working)*	Working (full- or part-time, incl. self-employed)	0.40** (0.14)	-0.03 (0.14)	0.22 (0.21)	0.71 (0.44)	-0.50* (0.24)
Living Area *(Ref: Rural)*	Urban	-0.13 (0.14)	-0.05 (0.13)	0.17 (0.19)	-0.33 (0.39)	0.25 (0.24)
Region *(Ref: Dublin)*	Rest of Leinster	-0.15 (0.18)	-0.02 (0.17)	0.15 (0.24)	-0.60 (0.45)	-0.17 (0.29)
	Munster	-0.02 (0.18)	0.35* (0.17)	0.02 (0.25)	-0.42 (0.43)	-0.01 (0.28)
	Connacht/Ulster	-0.15 (0.20)	0.03 (0.19)	-0.09 (0.29)	-1.98* (0.80)	-0.24 (0.33)
Country of Birth *(Ref: Outside Ireland)*	Ireland	0.28† (0.16)	-0.13 (0.16)	0.00 (0.22)	0.99 (0.61)	0.45 (0.30)
Child at Home *(Ref: No)*	Yes	0.28* (0.14)	0.13 (0.14)	-0.27 (0.20)	-0.39 (0.36)	-0.09 (0.24)
Constant		0.01 (0.29)	0.05 (0.28)	-2.05 (0.40)	-3.52 (0.88)	-2.95 (0.50)
N		1,197	1,200	1,200	1,197	1,200

Source: Authors' analysis.
Note: †$p < .10$; *$p < .05$; **$p < .01$; ***$p < .001$. Sample size in some models is below 1,200 because all three non-binary individuals gave the same response. The same model with reported odds ratios is presented in Appendix C.

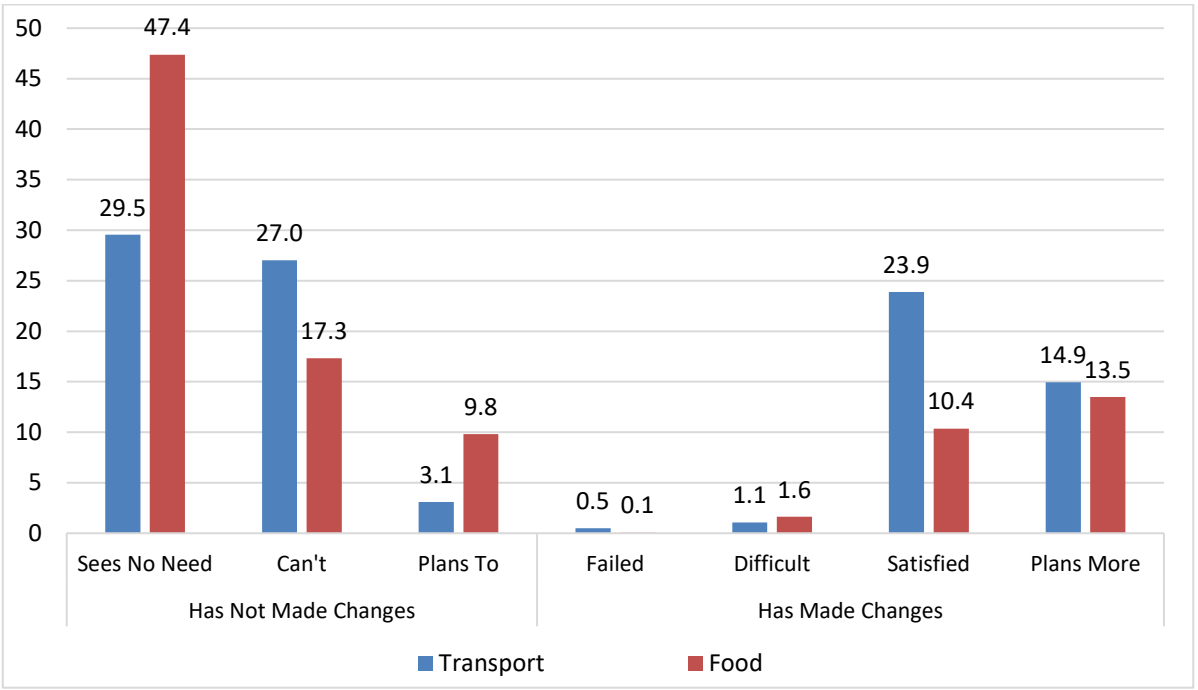
The follow-up questions after the diary task allow more detailed analysis of the transport and diet categories. Most participants (74.8 per cent) went somewhere the previous day and the majority of these (69.8 per cent) travelled by private vehicle at least once. Significantly more of those who travelled by private vehicle referred to their transport behaviour as mattering for their carbon footprint (79.6 per cent) whereas fewer of those who avoided car travel mentioned transport (55.3 per cent, $p < .001$). Turning to diet, two-thirds (67.8 per cent) of the sample reported eating meat the previous day, but, of these, just 2.5 per cent identified doing so as mattering for their carbon footprint. The proportion identifying the impact of meat on their carbon footprint was marginally higher among those who avoided meat the previous day (5.2 per cent, $p = .061$).

The findings in this section imply that, while the transport sector is best recognised by the public as a source of greenhouse gas emissions, one-in-five motorists do not consider the impact of their driving on the environment. More strikingly, although eating meat is considered to have one of the largest influences on an individual's carbon footprint, the vast majority of the public do not make this connection. It is perhaps notable that younger generations and those with higher levels of educational attainment do not appear to have much greater awareness of the environmental impact of various behaviours.

3.3 BEHAVIOUR CHANGES MADE

After reporting on their day-to-day behaviour, participants were asked if they had ever made changes to their transport or diet behaviour to reduce their carbon footprint (Figure 3.8). Those who had not were asked about any planned changes, while those who had were presented with a list of potential changes and asked which ones they had made.

FIGURE 3.8 'STAGE OF CHANGE' FOR TRANSPORT AND FOOD BEHAVIOURS (WEIGHTED)



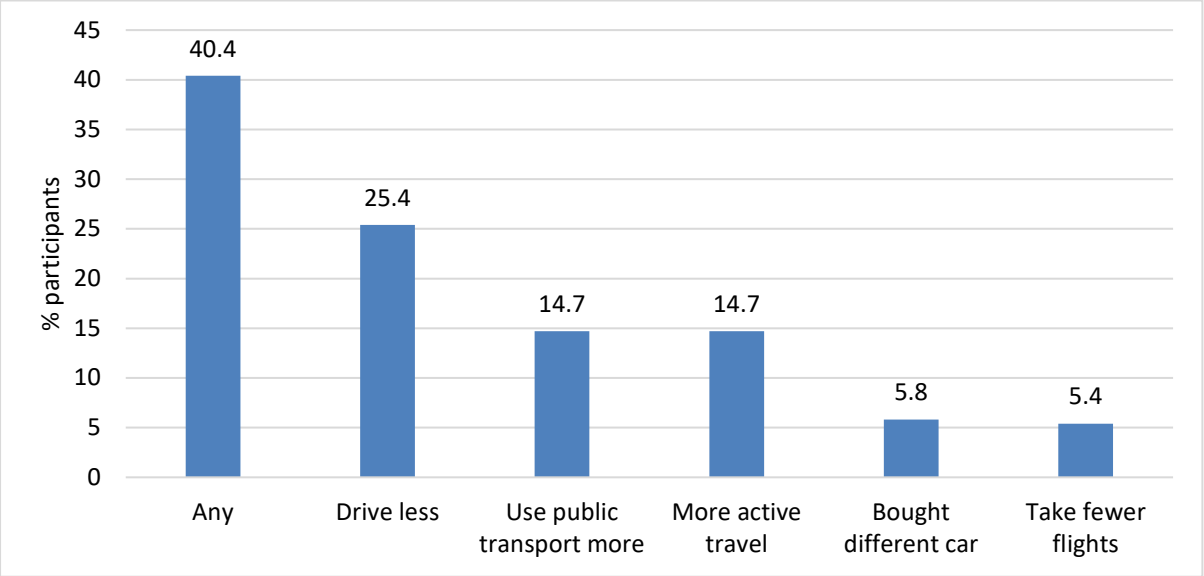
Sources: Authors' analysis.

3.3.1 Behaviour change – transport

Two-in-five (40.4 per cent) participants reported that they had made changes to their transport behaviour to reduce their carbon footprint. These changes are shown in Figure 3.9. In total, 25.4 per cent of adults reported that they drive less now in an effort to reduce their carbon footprint. The proportion increases to 29.0 per cent when looking at only those who themselves drive (n = 1,000). This change in behaviour is supported by comparing the number of days participants

reported travelling by private vehicle in a typical week. Drivers who reported driving less to reduce their carbon footprint drive, on average, 4.1 days per week, whereas those who did not report driving less drive 5.0 days per week ($t = 5.31$, $p < .001$).[14] Approximately 15 per cent of adults reported travelling more often by active means or by public transport. Lastly, just slightly more than one-in-twenty participants reported buying a particular type of car and a similar proportion reported taking fewer flights.

FIGURE 3.9 TRANSPORT BEHAVIOUR CHANGES (WEIGHTED)



Sources: Authors' analysis.

Table 3.5 presents a logistic regression model that predicts any change in behaviour and three additional models that predict the most common specific changes (driving less, walking or cycling more and using public transport more). Other than location-based predictors (e.g. living in Dublin), differences by socio-demographic subgroups are relatively small. The models show that over 60s are significantly more likely to report having changed their behaviour than younger groups (45.5 per cent vs 40.5 per cent of 40-59 year olds and 37.1 per cent of under 40s). The difference appears to be due to a higher likelihood of having reduced their driving and increased their public transport usage, possibly linked to reduced public transport fares, but individual models are not statistically significant (Figure 3.10). Those educated to degree level or higher are more likely to report having changed their transport behaviour (45.5 per cent vs 40.5 per cent with tertiary education below degree and 37.1 per cent of those with Leaving Certificate or below), and the difference is driven by increased reported use of public transport (Figure 3.10). Unsurprisingly there are large and consistent effects of where participants live. Those living in urban areas and in Dublin are more likely to

[14] For this comparison, we count driving less than once per month as driving 0.25 days per week and less than once per week as 0.5 days per week.

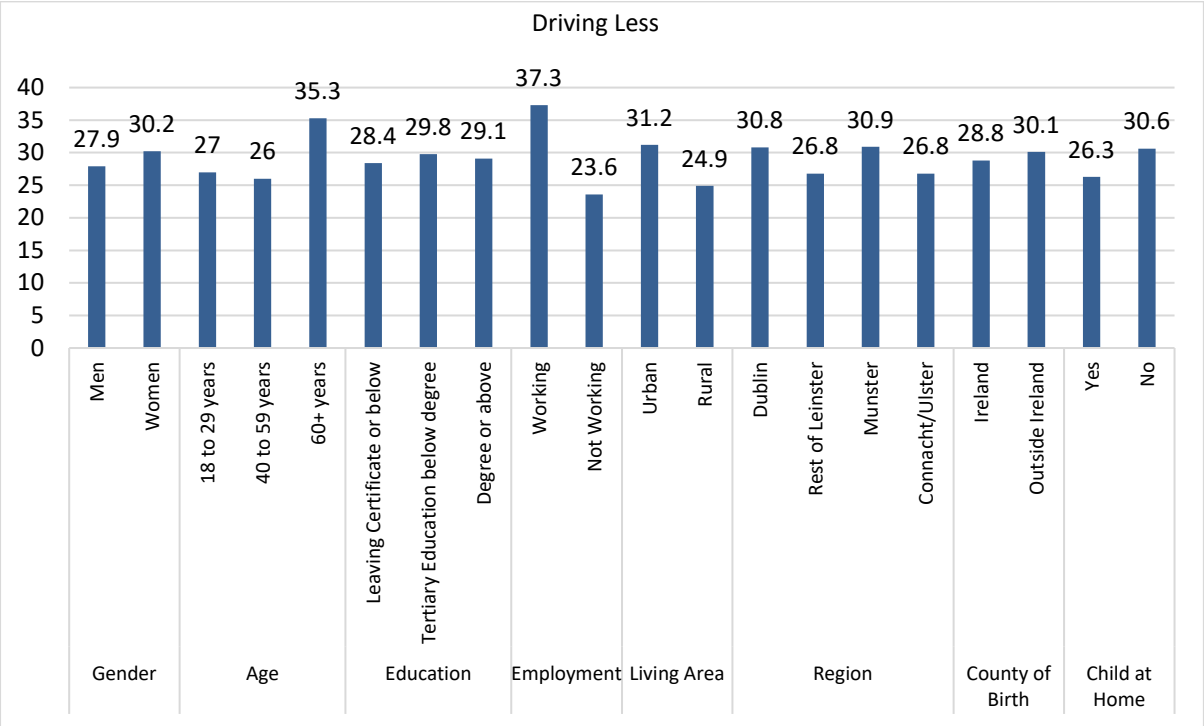
report having changed their behaviour, primarily with respect to increased active travel and public transport use (Figure 3.10). Notably, however, location has non-significant effects on driving less often.

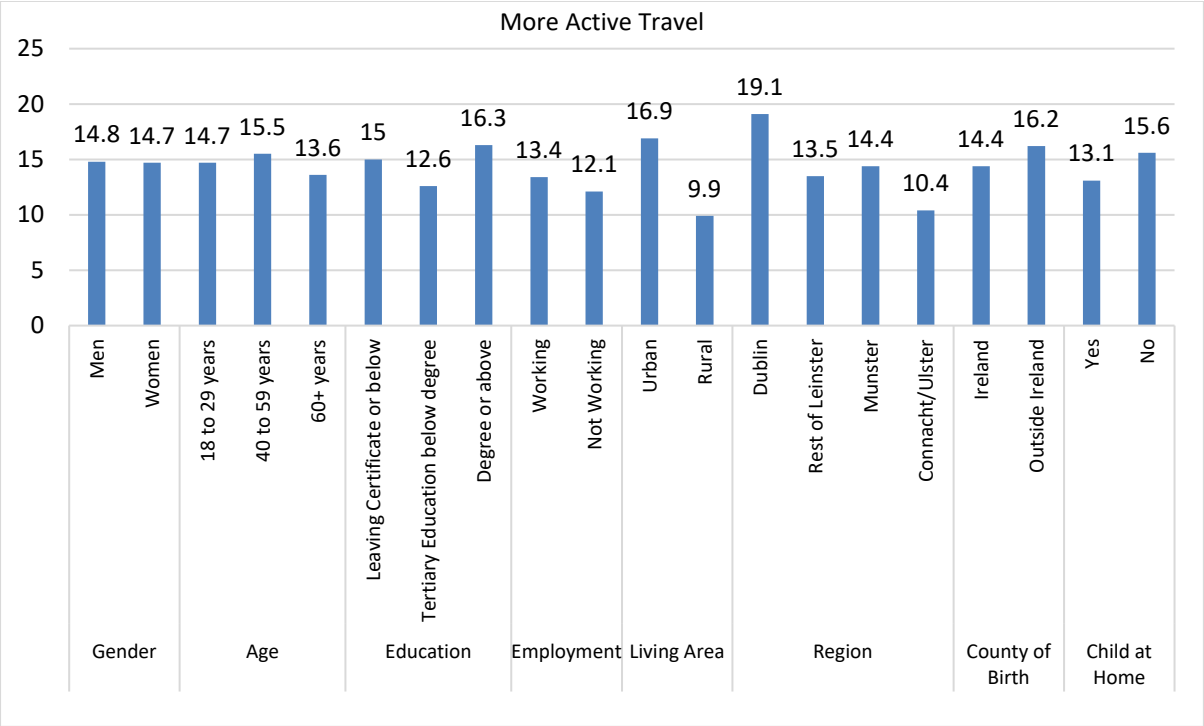
TABLE 3.5 LOGISTIC REGRESSION MODELS PREDICTING TRANSPORT BEHAVIOUR CHANGE

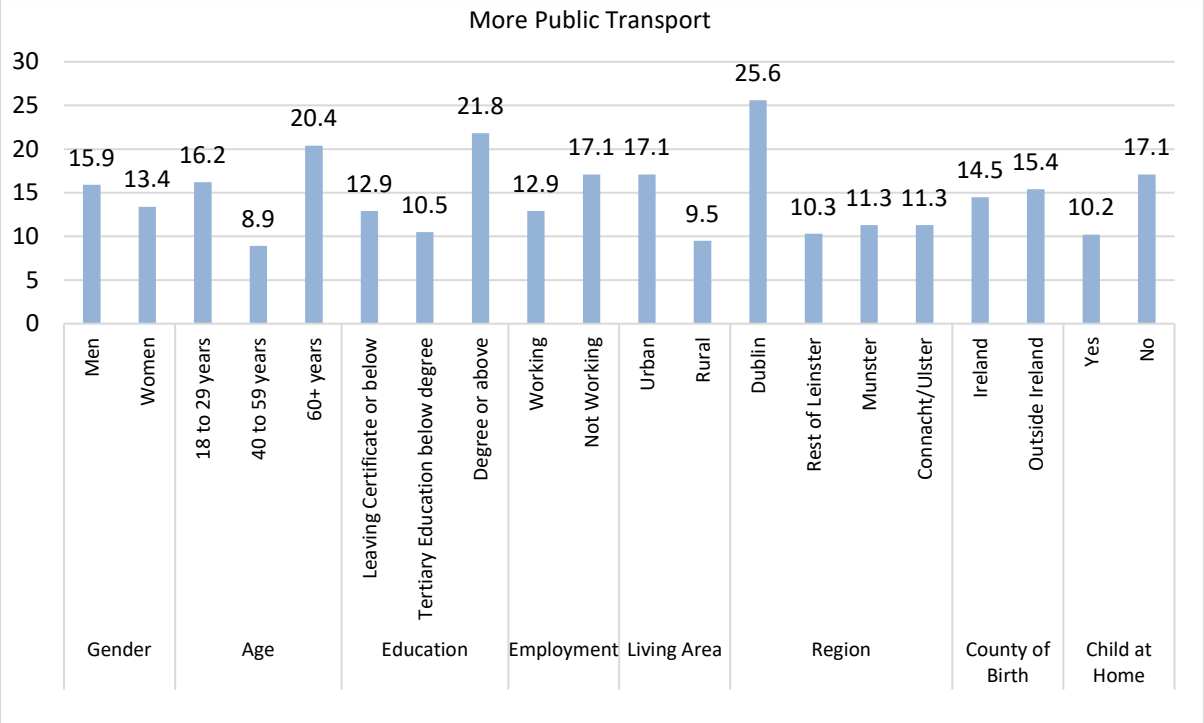
		Any Change	Driving Less	Walk/Cycle More	More Public Transport
Gender *(Ref: Woman)*	Man	-0.06 (0.12)	-0.17 (0.15)	-0.00 (0.18)	-0.13 (0.18)
Age *(Ref: 18 – 29 years)*	40-59 years	0.18 (0.15)	0.04 (0.18)	0.20 (0.21)	-0.35 (0.22)
	60+ years	0.46* (0.18)	0.23 (0.22)	-0.26 (0.27)	0.25 (0.24)
Educational Attainment *(Ref: Leaving Certificate or below)*	Tertiary Education below degree	0.18 (0.16)	0.04 (0.19)	-0.32 (0.23)	-0.06 (0.25)
	Degree or above	0.46* (0.18)	0.19 (0.18)	0.15 (0.21)	0.77*** (0.22)
Employment Status *(Ref: Not working)*	Working (full- or part-time, incl. self-employed)	-0.23 (0.14)	-0.54** (0.17)	-0.11 (0.21)	-0.26 (0.21)
Living Area *(Ref: Rural)*	Urban	0.34* (0.14)	0.25 (0.16)	0.35† (0.21)	0.24 (0.21)
Region *(Ref: Dublin)*	Rest of Leinster	-0.37* (0.17)	-0.23 (0.21)	-0.60* (0.25)	-1.04*** (0.24)
	Munster	-0.13 (0.17)	0.08 (0.21)	-0.39† (0.23)	-0.80** (0.24)
	Connacht/Ulster	-0.41* (0.20)	-0.19 (0.24)	-0.66* (0.29)	-0.73** (0.27)
Country of Birth *(Ref: Outside Ireland)*	Ireland	0.08 (0.16)	-0.02 (0.20)	-0.11 (0.22)	0.01 (0.23)
Child at Home *(Ref: No)*	Yes	-0.03 (0.14)	-0.11 (0.17)	-0.16 (0.29)	-0.38† (0.22)
Constant		-0.70 (0.28)	-0.70 (0.35)	-1.53 (0.20)	-1.32 (0.40)
N		1,200	1,000	1,197	1,200

Source: Authors' analysis.
Note: †$p < .10$; *$p < .05$; **$p < .01$; ***$p < .001$. Sample size in some models is below 1,200 because all three non-binary individuals gave the same response. The model for driving less excludes non-drivers. The same model with reported odds ratios is presented in Appendix C.

FIGURE 3.10 SOCIO-DEMOGRAPHIC DIFFERENCES IN TRANSPORT BEHAVIOUR CHANGE (WEIGHTED)





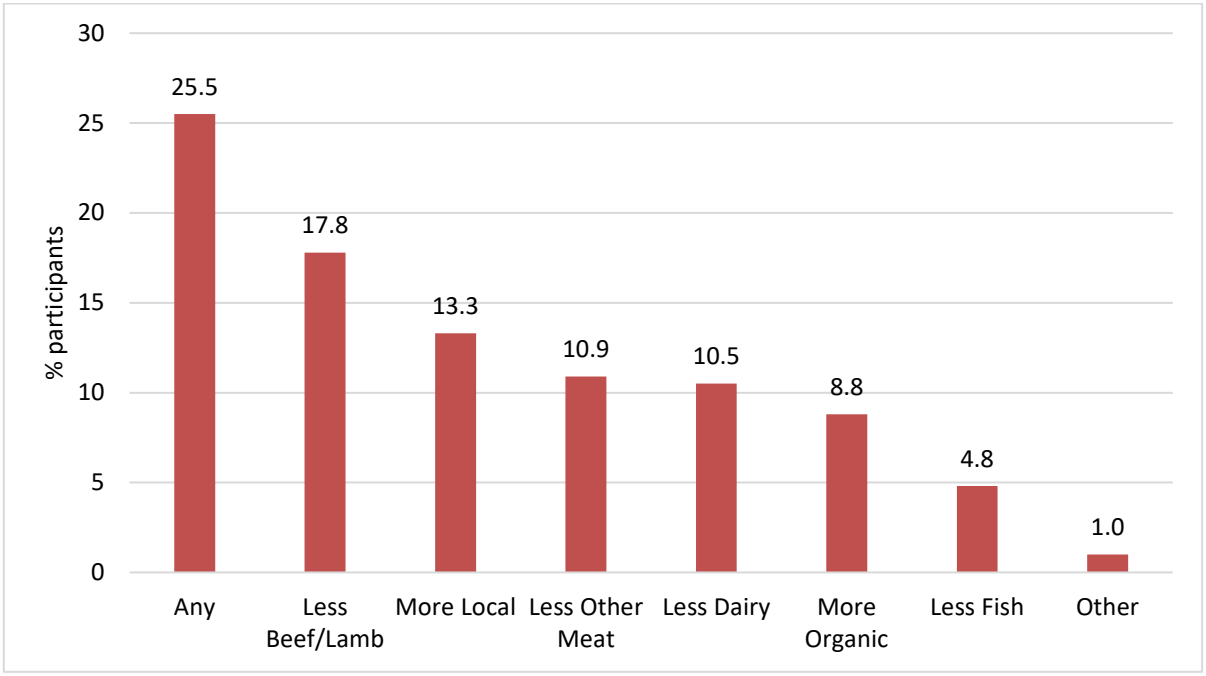


Sources: Authors' analysis.
Note: Percentages are weighted but otherwise unadjusted (i.e. they are not predicted probabilities).

3.3.2 Behaviour change – diet

Despite few participants spontaneously mentioning diet as important for their carbon footprint, when asked in a survey question, one-in-four participants reported having changed their diet to reduce their carbon footprint (25.5 per cent; Figure 3.11). The most commonly reported change was to reduce consumption of beef or lamb (17.8 per cent). Again, comparing the number of days per week beef is consumed between those who report having reduced their intake and those who have not revealed a significant difference: 1.6 days per week vs 1.1 days ($t = 5.14$, $p < .001$). Buying more 'local food' (13.3 per cent) was the next most common change. Approximately one-in-ten reported reduced intake of other meat and dairy.

FIGURE 3.11 FOOD BEHAVIOUR CHANGES (WEIGHTED)



Sources: Authors' analysis.

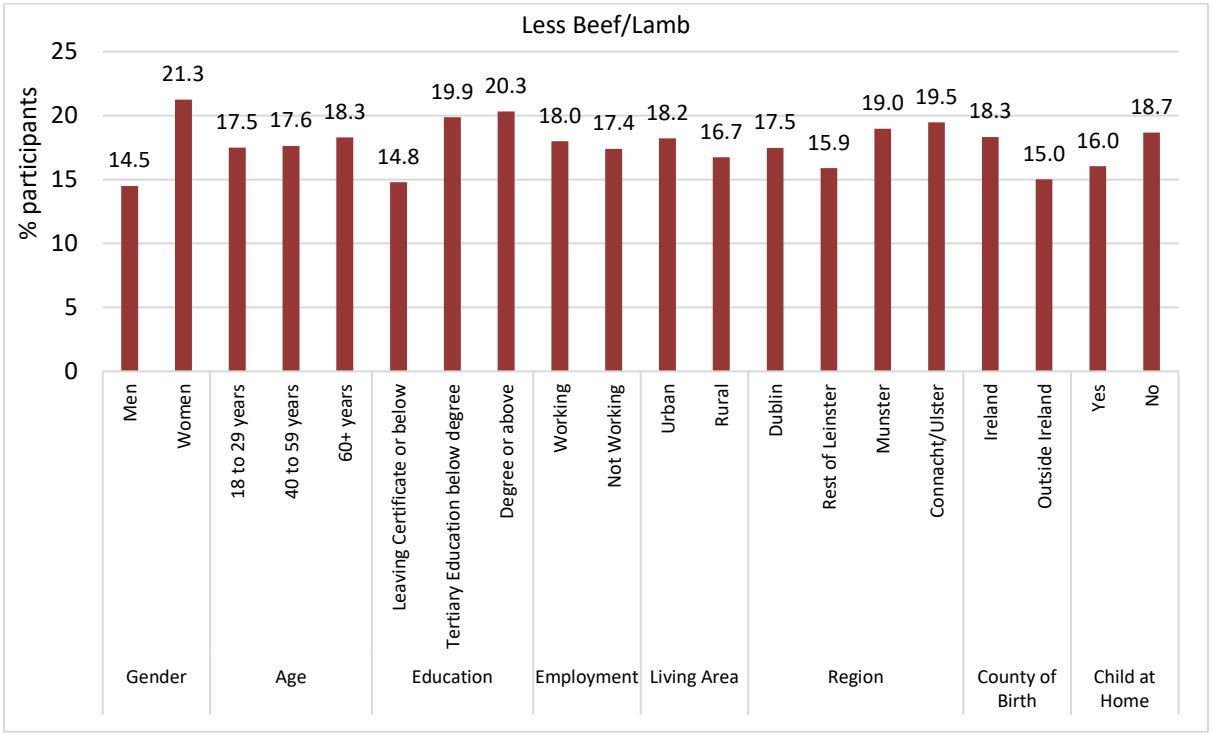
Table 3.6 presents logistic models that predict behaviour change related to food. Women are more likely to report having changed what they eat to reduce their carbon footprint than men (29.7 per cent vs 21.6 per cent), and this is true for reducing beef, lamb and dairy consumption, and eating local food more often (Figure 3.12). Those with higher educational attainment also report having made more food-related changes (29.8 per cent in the highest group vs 20.6 per cent in the lowest group), including reducing beef, lamb and dairy intake, and buying more locally produced food (Figure 3.12). There are again no significant differences between those living in urban and rural areas, nor do young people appear to have altered their diet relative to older people.

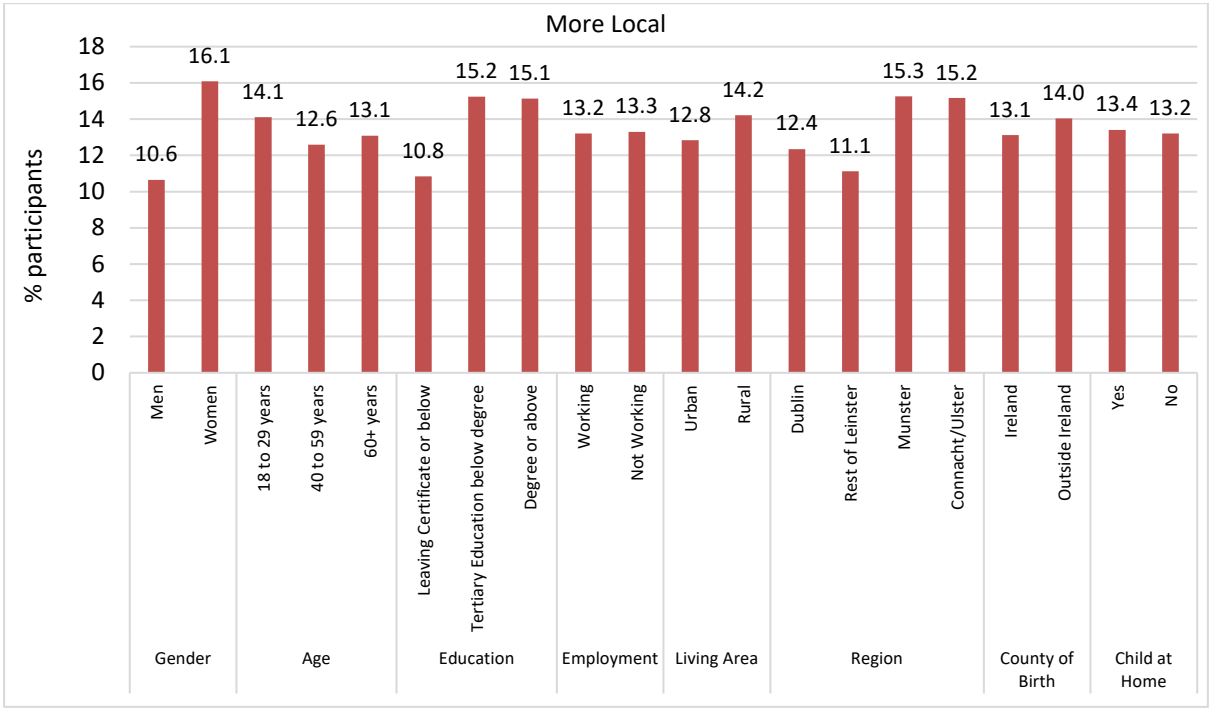
TABLE 3.6 LOGISTIC REGRESSION MODELS PREDICTING FOOD BEHAVIOUR CHANGE

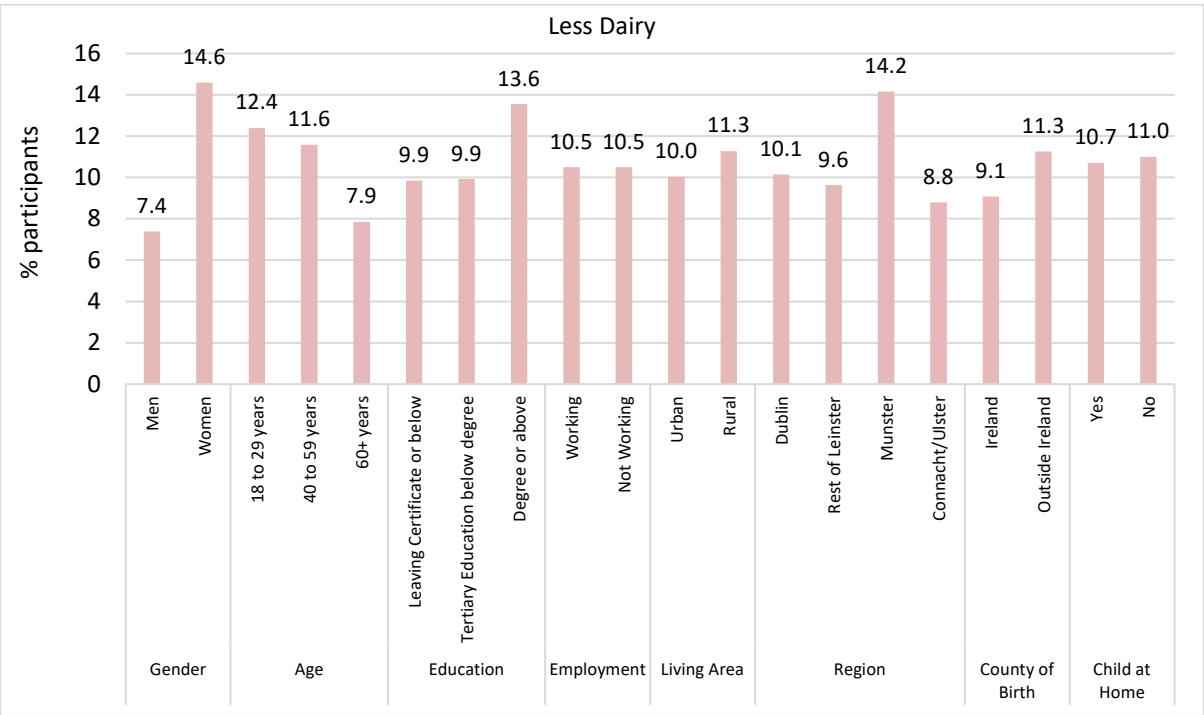
		Any Change	Less Beef/Lamb	More Local	Less Dairy	Less Other Meat
Gender *(Ref: Woman)*	Man	-0.45** (0.14)	-0.53** (0.16)	-0.61** (0.18)	-0.26 (0.20)	-0.74*** (0.19)
Age *(Ref: 18 – 29 years)*	40-59 years	-0.07 (0.16)	0.09 (0.18)	-0.18 (0.20)	-0.32 (0.22)	0.04 (0.21)
	60+ years	0.01 (0.20)	0.14 (0.23)	0.12 (0.25)	-0.72* (0.29)	-0.32 (0.28)
Educational Attainment *(Ref: Leaving Certificate or below)*	Tertiary Education below degree	0.45** (0.17)	0.26 (0.20)	0.32 (0.22)	0.44† (0.25)	-0.05 (0.40)
	Degree or above	0.56** (0.17)	0.45* (0.19)	0.46* (0.22)	0.26 (0.29)	0.40† (0.23)
Employment Status *(Ref: Not working)*	Working (full- or part-time, incl. self-employed)	-0.02 (0.16)	0.04 (0.18)	0.10 (0.20)	-0.20 (0.22)	0.00 (0.22)
Living Area *(Ref: Rural)*	Urban	0.13 (0.15)	0.09 (0.18)	-0.04 (0.19)	0.34 (0.22)	0.09 (0.21)
Region *(Ref: Dublin)*	Rest of Leinster	0.06 (0.20)	-0.16 (0.22)	0.01 (0.25)	0.09 (0.28)	-0.15 (0.27)
	Munster	0.28 (0.19)	0.07 (0.22)	0.17 (0.25)	0.37 (0.27)	0.21 (0.26)
	Connacht/Ulster	0.20 (0.22)	0.07 (0.25)	0.21 (0.28)	0.23 (0.31)	-0.02 (0.30)
Country of Birth *(Ref: Outside Ireland)*	Ireland	0.04 (0.18)	0.21 (0.21)	-0.11 (0.22)	-0.20 (0.31)	0.20 (0.25)
Child at Home *(Ref: No)*	Yes	-0.15 (0.15)	-0.26 (0.18)	0.03 (0.19)	-0.33 (0.22)	-0.26 (0.21)
Constant		-1.32 (0.32)	-1.72 (0.36)	-1.85 (0.40)	-1.95 (0.44)	-1.96 (0.43)
N		1,197	1,197	1,197	1,197	1,197

Source: Authors' analysis.
Note: $^{\dagger}p < .10$; $*p < .05$; $**p < .01$; $***p < .001$. Sample size in some models is below 1,200 because all three non-binary individuals gave the same response. The same model with reported odds ratios is presented in Appendix C.

FIGURE 3.12 SOCIO-DEMOGRAPHIC DIFFERENCES IN FOOD BEHAVIOUR CHANGE (WEIGHTED)







Sources: Authors' analysis.
Note: Percentages are weighted but otherwise unadjusted (i.e. they are not predicted probabilities).

3.4 PERCEIVED DIFFICULTIES TO BEHAVIOUR CHANGE

Three groups of participants were asked about the things that made behaviour change difficult: those who had not changed their behaviour to reduce their carbon footprint but would like to; those who had made a change that they were finding difficult; and those who had made a change but found it too difficult to maintain. In total, these criteria meant that 589 (49.1 per cent of the sample) participants were asked about transport change difficulties and 524 (43.6 per cent) were asked

about difficulties changing their diet. These questions were not incentivised and answering them resulted in a slightly longer survey; responses reflect the views of participants intrinsically motivated to offer them.

3.4.1 Perceived difficulties – transport

Of those asked about perceived transport change difficulties, 96.5 per cent identified at least one, 55.5 per cent identified at least two and 21.5 per cent identified at least three. In total, there were 1,151 responses to this question that were qualitatively coded by two independent raters (ST, YA). Again, agreement was 'almost perfect' at 96.1 per cent ($\kappa = .87$, $p < .001$) and disagreement was resolved through discussion. Here, we first report the general transport domain that participants considered when thinking about difficulties to changing their behaviour (i.e. changing their vehicle, using public transport or active travel). We then report specific difficulties according to the framework presented in Table 3.7.

TABLE 3.7 TRANSPORT CHANGE DIFFICULTY CATEGORIES

Category	Description	Example
Cost	Cost in general or of purchasing an electric car or alternative mode of transport	*'Affordability'* *'Buying an electric car is too expensive to buy even with government subsidies'*
Disability	Health, mobility or disability (themselves or family member)	*'I am a mother of special needs kids who struggle greatly with public transport'* *'I have arthritis and can't walk much'* *'Look after elderly parent who is not very mobile so need car'*
Distance	General reference to distance.	*'I do not live close to my workplace'* *'Too far to nearest shop'*
EV Infrastructure	Reference to lack of public EV charging ports or inability to install a port in one's home	*'Because there are not enough EV chargers'*
Family (non-disability)	Reference to family or caring responsibilities without mentioning disability	*'Because my parents live in rural Wexford, I need to use my car to visit'* *'I have a four-year-old son and it's difficult to travel with him by car let alone for it by public transport'*
Other	Difficult to code or outside of other categories	*'I forget'* *'I cannot change how electricity is produced'* *'Hard to decide what would be good'*
Preference	Reference to inconvenience of not driving or simply preferring to drive	*'I like driving'* *'It is the most convenient way for me to get to work'*
Public Transport	General reference to public transport, its availability or reliability	*'Availability of public transport'* *'Because I live in a village with sporadic unreliable public transport'*
Rural	General reference to living in a rural area without specifying public transport or active travel difficulties	*'I live in a remote area'* *'I live in the countryside'*
Safety	Safety concerns with respect to active travel	*'Because I live on a busy road with no paths or lighting…'* *'Cycling is too dangerous'*
Time	General reference to time constraints or travelling by car being fastest	*'I am too tight for time and the car is the quickest way'* *'It'd take time… out of our morning schedule to walk to the school…'*
Weather	Reference to the weather as a barrier to active travel	*'We can't walk to school mostly because of bad weather'* *'The weather is gone crazy from global warming'*
Work	Driving as a necessary part of their work	*'I am a sales rep so driving is part of my job'* *'I'm a part time bus driver'*

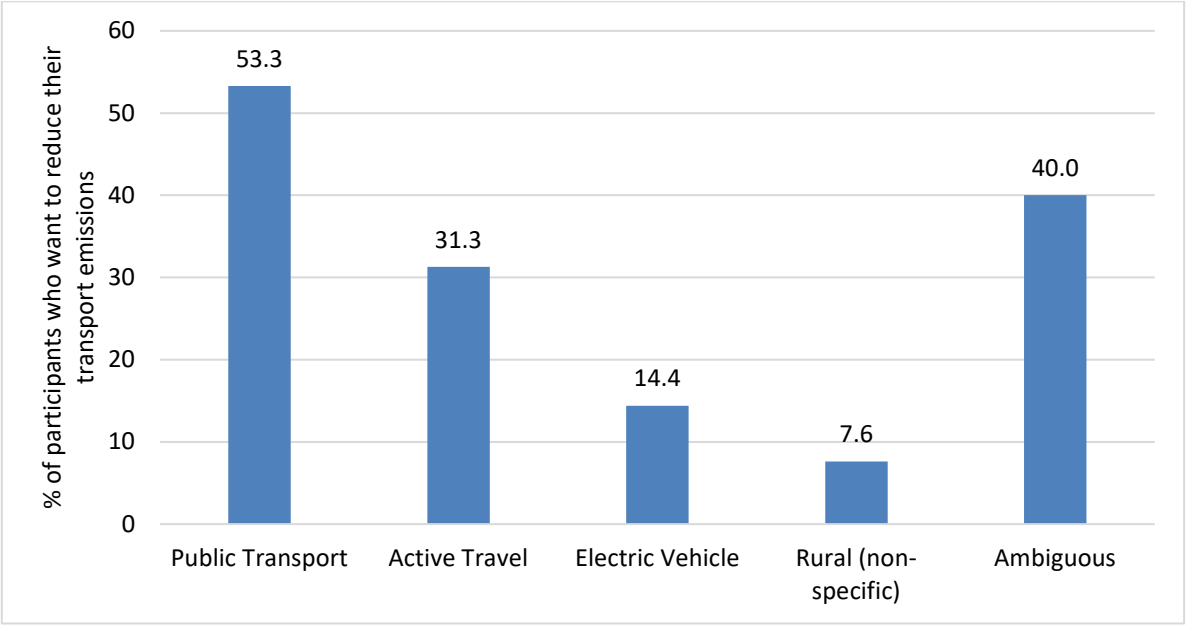
Source: Authors.

Among participants who clearly specified a transport domain, the most commonly mentioned difficulties to transport change concerned public transport, followed by active travel (Figure 3.13). These figures give an idea of the kind of alternatives to driving the public are considering. Figure 3.14 presents a more detailed breakdown of the perceived difficulties to change mentioned. Almost half of those who report wanting to change their behaviour to reduce their emissions cite lack of availability

and reliability of public transport. About one-in-four cite cost, many of which related to the cost of purchasing an electric vehicle.

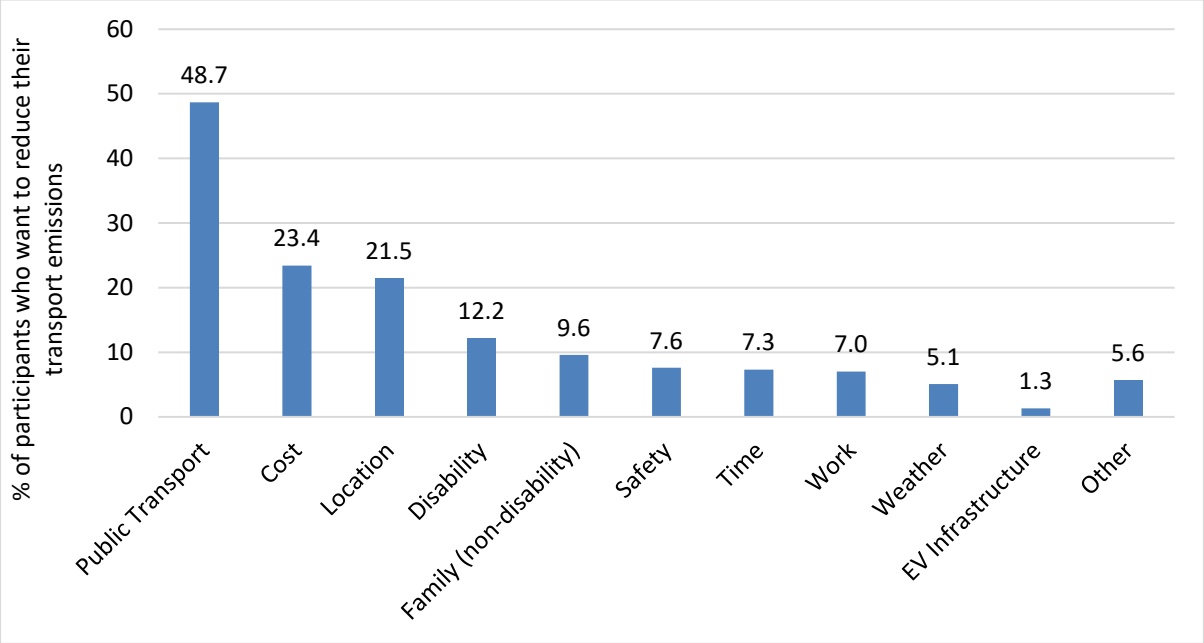
The types of difficulties generated by those who report a desire to reduce their transport carbon footprint can be further classified into ones that are primarily determined by policy and those that depend on the individual. For example, the availability of public transport, affordability of EVs (e.g. through grants) and quality of active travel infrastructure could all reasonably be considered as influenced by policy. Further analysis showed that 66.7 per cent mentioned at least one of these policy-determined difficulties, whereas 34.9 per cent mentioned *only* policy-determined difficulties to behaviour change. The next most commonly cited reasons for finding change difficult were location (e.g. distance to work, living in a rural area) and having a health condition (either themselves or a family member). These reasons could be classified as individual-level ones but, at least for some, could be alleviated through policy – for example, by broadening availability of public transport, through regional development or by addressing access issues. Fewer participants considered difficulties concerning active travel but among those, safety concerns outnumbered concerns about the weather. For difficulties with behaviour change, we do not model differences by socio-demographic subgroups. This is because cell sizes are too small for many of the mentioned difficulties to allow for robust inference while, for others, the nature of the difficulty implies specificity to a subgroup (e.g. living in a rural area).

FIGURE 3.13 TRANSPORT DIFFICULTY DOMAINS (WEIGHTED)



Sources: Authors' analysis.

FIGURE 3.14 PERCEIVED DIFFICULTIES TO TRANSPORT BEHAVIOUR CHANGE (WEIGHTED)



Sources: Authors' analysis.

3.4.2 Perceived difficulties – food

For diet, 93.8 per cent identified at least one perceived difficulty to change, 42.3 per cent identified at least two and 21.2 per cent identified at least three. In total, there were 872 reasons identified that were qualitatively coded by two independent raters (ST, YA). Again, agreement was 'almost perfect' at 97.6 per cent ($\kappa = .89$, $p < .001$) and disagreement was resolved through discussion. We report here the perceived difficulties mentioned according to the framework presented in Table 3.8. Note that difficulties can refer to changing the type of food eaten (e.g. reducing meat or dairy) or other aspects of food (e.g. buying local or organic). We do not differentiate between these changes here because most entries were ambiguous, relating to food changes in general.

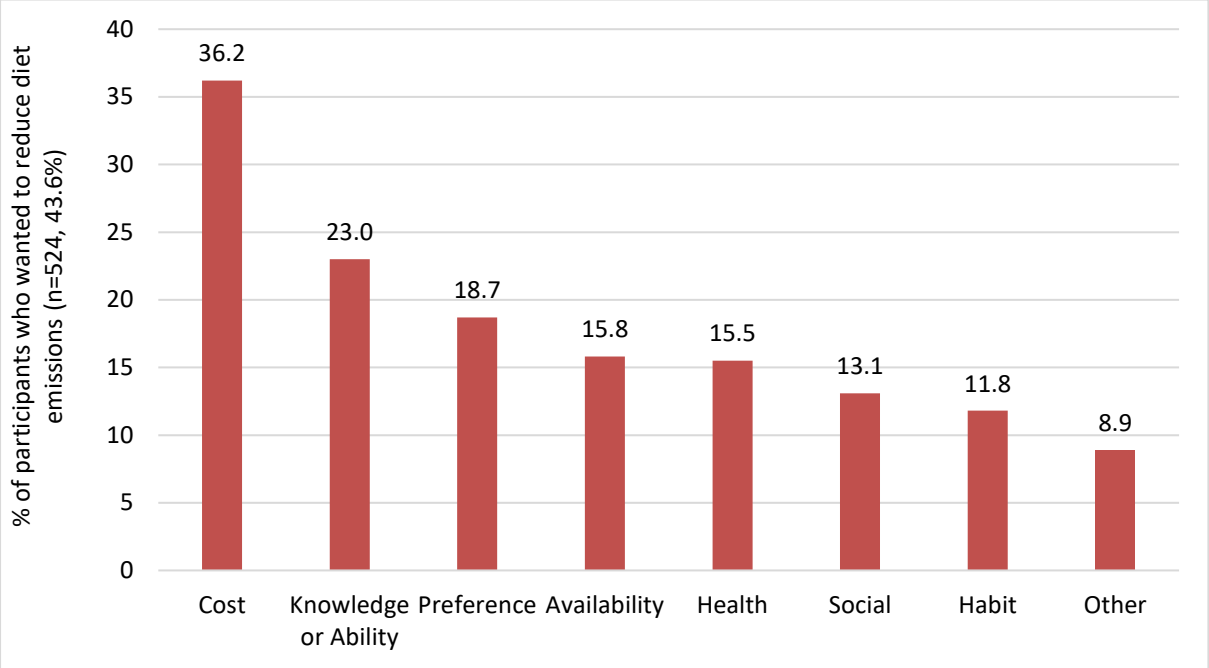
TABLE 3.8 DIET CHANGE DIFFICULTY CATEGORIES

Category	Description	Example
Availability	Finds it difficult to source alternatives, including local and meat-free alternatives	*'Because I find it hard to find local produce in my supermarket'* *'I do try not to eat meat but it is difficult when the deli at work doesn't offer alternatives'*
Cost	Reference to costs in general or perceptions that alternatives are more expensive	*'Cost of local organic food'* *'Vegan/vegetarian alternatives can be expensive'*
Habit	Reference to habits, routine or lack of willpower	*'Cut down meat eating is hard'* *'Habit – I'm accustomed to cooking certain meals'* *'My willpower is weak and I love a bacon sambo'*
Health	They or someone they cook for has a health condition or dietary necessity, or specific reference to micro- or macro-nutrients	*'Anaemic, need iron from red meat'* *'Because I have food allergies and intolerances so my diet is already restricted and difficult to manage'* *'Making sure I hit protein requirements'*
Knowledge	Does not know how to prepare alternatives or what to purchase	*'There's not much information on products saying if they are carbon friendly or not'* *'Hard to know what to eat'*
Other	Difficult to code or outside of other categories	*'Eating all my own veg'* *'We rarely order takeaway food already'*
Preference	General preference for the taste of meat or dislike of alternatives	*'Because I love meat'* *'I don't like vegan products'* *'I only like certain things'*
Social	Relies on others for food or cooks for others who do not want to change their diet	*'I am not in charge of the shopping'* *'Fussy eaters at home'* *'Cooking for family who prefer to eat meat'*

Source: Authors.

Figure 3.15 shows the percentage of participants who reported each type of reason for finding diet change difficult. The most common perceived difficulty with change, reported by over one-third of those who want to reduce their food-based emissions, was the cost of alternatives. While most entries were ambiguous about exactly which alternatives were viewed as more expensive, many related to the cost of organic and locally-produced food rather than the cost of alternatives to meat. The next most common perceived difficulty, mentioned by almost one-quarter, was lack of knowledge about how to choose climate-friendly alternatives or how to prepare sustainable meals. This group, and those who find it difficult to source alternatives (15.8 per cent), represent potential targets for interventions that seek to inform individuals already motivated to change their diet about ways to do so. Together, these perceived difficulties present a straightforward solution to assist consumers in shifting towards more sustainable diets: easy-to-access information on what to purchase and how to prepare low-cost alternatives to meat-based meals.

FIGURE 3.15 PERCEIVED DIFFICULTIES TO DIET BEHAVIOUR CHANGE (WEIGHTED)



Sources: Authors' analysis.

CHAPTER 4

Discussion

The aim of this report was to investigate the discrepancy between positive general attitudes towards climate action and continued engagement in specific behaviours that are associated with high emissions. To do so, we designed a unique study to measure behaviour, identification of behaviours linked to an individual's carbon footprint, behaviour change and perceived difficulties with change. In this chapter, we summarise the main findings and present policy implications for transport and food behaviour. We also discuss implications for home energy use and consider comparisons by socio-demographic subgroups of the population.

4.1 TRANSPORT: SUMMARY AND POLICY IMPLICATIONS

Similar to other surveys of travel behaviour (e.g. Central Statistics Office, 2020; National Transport Authority, 2018), we find heavy reliance of private vehicles for transport. Half of the adult population report driving five days or more per week, while most use public transport less than once per week and never cycle. Many journeys taken by car cover relatively short distances. According to the National Travel Survey, most car journeys are not related to work (i.e. neither driving for work nor commuting; Central Statistics Office, 2020), implying considerable scope for behaviour change.

A minority of motorists (just one-in-four) report having already begun driving less in an effort to reduce their carbon footprint. Although this group appear to have achieved the Climate Action Plan (2023) target of a 20 per cent reduction in driving (i.e. one less day per week), there is a clear and substantial shortfall. It is thus vital to identify perceived difficulties to transport behaviour change among the remainder of motorists, given that they report high levels of worry about climate change and believe their individual action could make a difference.

As outlined in Chapter 1, a first issue to consider when investigating lack of behaviour change is whether the public is aware that the behaviour of interest is problematic. With respect to transport behaviour, lack of awareness does not appear to be a prominent issue. Two-thirds of people can identify – without prompting – transport as a behaviour that matters for their carbon footprint, with the proportion rising to four-in-five of those who had driven the previous day. Thus, improving awareness of transport emission sources likely matters less for changing behaviour than factors related to the behavioural context.

When people who are willing to change their transport behaviour are asked about reasons for finding it difficult, the majority volunteer reasons that are tied to policy. The most common perceived difficulty is the availability and reliability of public transport. Our socio-demographic models of transport behaviour show that where public transport is more widely available (i.e. in Dublin and urban areas), people use private vehicles far less and public transport more often. Since approximately half of our sample report wanting to change their transport behaviour and approximately half of those reported issues concerning public transport, our results imply that one-in-four of the public have the potential to shift to using public transport if it were more widely available.

4.1.1 Policy implications

There is widespread awareness among the public that road transport contributes to climate change. That said, there is still need to reach the one-in-five drivers who fail to realise the environmental impact of travelling by private vehicle. However, the largest gains are likely to be achieved by increasing the supply (and reliability) of public transport, particularly outside Dublin. This is a clear aim of the Climate Action Plan for Transport (Government of Ireland, 2023). Given widespread reference to location-based impediments to behaviour change, planning policy may benefit from further 'Transport Oriented Development', (i.e. targeting development close to existing transport services, as outlined in Department of Housing, Local Government and Heritage and Department of Transport, 2023). Moreover, disability was the fourth most common perceived difficulty to changing transport behaviour. Existing and planned public transport provision that ensures accessibility for people with mobility difficulties could therefore increase usage.

The second most commonly mentioned perceived difficulty to transport behaviour change was cost, primarily in relation to switching to an EV. Existing grants contribute a small proportion to the cost of an EV and may need to be increased if accelerated uptake is prioritised. Cost-related reasons impeding EV uptake were mentioned far more than other logistical challenges, such as limited driving range or the availability of charging ports. However, the prevalence of cost-related concerns perhaps presents an opportunity to signal the cost efficiency of public transport relative to private vehicle use where public transport is already available. International research shows that motorists greatly underestimate the full private cost of car ownership (Gössling et al., 2022). Cost concerns might be more efficiently addressed by further lowering public transport fares or implementing fare-free travel.

Although awareness of transport-emissions is high, it is noteworthy that most people do not think about active travel when asked about the difficulties they face in changing how they get around, despite the high prevalence of relatively short distance travel. Cycling and walking are the lowest carbon ways to travel, but less

than one-in-three of those who said they would like to change their transport behaviour referred specifically to difficulties with travelling by active means. Of those who did, reasons related to safety and infrastructure, supporting policies set out in the Climate Action Plan (2023). For a review on how to design active travel infrastructure that promotes actual and perceived safety, see Timmons et al. (2024).

4.2 FOOD: SUMMARY AND POLICY IMPLICATIONS

Food choice too appears to show considerable scope for behavioural change to reduce diet-embedded emissions. Taking the conservative assumption that those who report eating beef or lamb once per week consume no more than the recommended portion size (i.e. 98g, equivalent to three rashers of bacon), our results suggest that almost half of adults consume more than double the Planetary Health Diet recommendations. Note that our approach to estimating meat consumption is conservative, with other estimates suggesting that consumption of red meat may be quadruple the Planetary Health Diet (Central Statistics Office, 2023; Hyland et al., 2017).

Unlike transport behaviour, where awareness of the emissions produced is high, dietary behaviour is afflicted by a lack of awareness of emissions embedded within the type of food eaten. The large majority of the public, when incentivised to list behaviours that matter the most, fail to identify that what they eat matters for their carbon footprint. Moreover, even the minority (about one-in-six) who report having reduced their red meat intake for environmental reasons fail to consider their diet as mattering most for their carbon footprint. It is hence unsurprising that most people have not changed their diet and do not intend to, despite surveys showing favourable attitudes towards climate change mitigation.

Among the minority who report a willingness to change their diet, lack of knowledge emerges as a consistent reason why change is perceived as difficult. The most common perceived difficulty reported was not knowing what to eat or how to prepare sustainable food. The next most common is likely to be a misperception: consumers believe that switching to a lower-carbon diet will be more expensive than their current one, despite analyses of the Planetary Health Diet for Ireland estimating that consumers would save money doing so (Williams et al., 2020). We have no reason to doubt the authenticity of these perceived difficulties: participants had no incentive to report a desire to change their diet nor justify not having done so, and completed a slightly longer version of the survey by providing these answers.

4.2.1 Policy implications

Policy interventions to support dietary behaviour change appear more straightforward (and less costly) to implement than policy interventions to support transport behaviour change. There is clear scope to improve awareness of the link between type of food consumed and greenhouse gas emissions, particularly with respect to relative impact; more than twice as many people mentioned how food is produced than the type of food, despite the latter being more strongly associated with emissions (Ritche et al., 2023). This is perhaps unsurprising. There is no current policy strategy on reducing diet-embedded emissions and the link between dietary choice and pollution is probably a less intuitive and long-standing concept than the link between transport vehicles and pollution. The only reference to diet in Ireland's Climate Action Plan (2023) is the reduced risk of health conditions like heart disease from reduced meat consumption, with no corresponding action to encourage this shift.

There are several potential pathways to help consumers reduce their dietary carbon footprint. Future Climate Action Plans may consider specific actions related to dietary emissions, including specifying organisations who may be best placed to balance the science of food's environmental impact with the public's nutritional requirements (e.g. the HSE, Food Safety Authority, Safefood.net). Provision of information on what to buy and how to prepare food within the guidelines provided by the Planetary Health Diet would help the public to change the frequency of high-carbon food consumption, while eating more healthily and potentially saving money (Geibel and Freund, 2023; Williams et al., 2020). General advice to avoid over-consumption and highly processed foods may be of further help (Hyland et al., 2017). There may also be benefits to improving the clarity of environmental labelling on foods to help consumers choose lower-impact alternatives (e.g. Osawe et al., 2023) or developing methods for delivering personalised recommendations to individuals (Davies et al., 2023).

Moreover, while there are environmental benefits to reduced red meat consumption, the economic implications are less straightforward. While most beef produced in Ireland is exported (Central Statistics Office, 2023), reducing red meat consumption would have a substantial impact on emissions from agriculture (Geibel and Freund, 2023). However, reducing domestic demand would naturally have implications for the earnings and livelihoods of those who work in the beef production sector. Principles of 'just transition' imply the need to provide support to this sector, for example to assist transition to other types of production (Murphy et al., 2022).

More broadly, for both transport and food, cost was among the top reported reasons for finding changes difficult among those willing to change their behaviour.

The implication is that taxation of emissions and subsidies for climate friendly options are likely to encourage and facilitate behaviour change. Although such price mechanisms can disproportionately affect lower income households, other ESRI studies show that recycling taxes via targeted welfare payments can reverse regressive effects and may benefit those with lower incomes (O' Malley et al., 2020; Tovar Reaños and Lynch, 2022).

4.3 HOME ENERGY USE

Home energy use was not a focus of this study, but nevertheless emerged as a carbon-relevant behaviour with relatively high awareness: a majority identified some kind of home energy use in the open-text task – four times more than the next largest category (waste). However, there are large misconceptions about which appliances are associated with greater energy use. More people mentioned cooking and food preparation than any other category (one-in-five), despite ovens accounting for a relatively low proportion of household energy use. Typical heating costs are 45 times greater than the cost of watching TV, but were listed by just 50 per cent more people. Hence there is considerable scope for informing the public on the relative energy consumption of home appliances, in order to reduce household bills and associated emissions. Consumers may benefit from informational campaigns on the power usage of home appliances, for example from the SEAI. (We caveat this point with a note that awareness of energy-related consumption may be seasonal, although the scale of the difference implies need for improved awareness nonetheless.)

4.4 SOCIO-DEMOGRAPHIC DIFFERENCES

We observe perhaps surprisingly few differences between socio-demographic subgroups of the population. The models in Chapter 3 replicate some well-known and expected associations: men report eating more meat and are less likely to have reduced their beef intake, and living in Dublin or an urban area is associated with driving less and more use of public transport.

Other differences – and lack thereof – are perhaps more notable. Although we observe large and consistent differences in transport behaviour between urban and rural respondents, we see no such differences with respect to diet. The estimates for beef or lamb consumption (more than once per week) and consumption of other meat (more than twice per week) are higher for those living in urban areas, implying that beef or lamb consumption is not driven by connection to farming or agriculture. In general, this report finds almost no evidence of a meaningful urban-rural divide relating to climate action.

Despite a narrative that climate action is the purview of younger generations, age-related differences are also small. Older respondents report consuming beef more

often, but there is just a 3.8 percentage-point difference between under 40s and over 60s in those who consume beef or lamb more than once per week (45.0 per cent vs 48.8 per cent). While statistically significant, an effect of this scale is inconsistent with a view that younger people are taking more extreme climate action, at least with respect to their diet. This finding is consistent with other research showing that awareness of the relative impact of diet is poor among all age groups (Andersson et al., 2022). Similarly, despite some evidence that children can foster climate change concern among their parents (e.g. Lawson et al., 2019), participants with a child in the home engage more frequently in both high-emission behaviours. This evidence may provide some groundwork for future evaluations of the Climate Action and Sustainable Development module for Leaving Certificate, which is in consultation at the time of writing.[15]

Educational attainment is consistently related to our behaviours of interest. Although those with higher levels of education are more likely to report having changed their transport and diet behaviour to reduce their carbon footprint, there is no observable difference in their driving frequency, and they report eating beef more often than individuals with lower levels of educational attainment. Both effects may be true: perhaps those with higher educational attainment started from far higher levels of both behaviours. This group nonetheless offers the greatest scope for behaviour change. Note that educational attainment is typically linked to higher levels of income, and there is growing focus internationally on the increased capacity among those with greater wealth to reduce their carbon footprint (e.g. Moorcroft et al., 2024). However, in our case, the association between educational attainment and our behaviours of interest remain when social grade, a standard measure of socio-economic status, is added as a control variable (available on the project's Open Science Framework page).[16]

More generally, the findings have implications for policy targeting. Although climate action is often perceived as a young, urban, middle-class issue (Government of Ireland, 2022), our findings suggest the largest difference between this group and others does not concern a contrasting approach to climate action, but rather their opportunity to avail of sustainable transport alternatives. Hence, trying to communicate differently to segments of the population based on these characteristics may be less beneficial for facilitating behaviour change than taking broader perspectives on the contextual barriers that prevent it. For example, in order to achieve reductions in private vehicle use, providing public transport in underserviced areas and incorporating sustainable transport consideration in planning policy will likely have greater success than targeting awareness campaigns at groups that travel by car most often. Similarly, although we observe that people

15 https://ncca.ie/en/senior-cycle/curriculum-developments/climate-action-and-sustainable-development/.
16 https://osf.io/7q5ak/.

with children at home eat more red meat, broad information campaigns on how to prepare cheaper sustainable meals[17] may be more successful at reducing food-based carbon footprints than specific subgroup targeting.

4.5 LIMITATIONS

Our study required participants to have both willingness and capacity to take part in an online study about their day-to-day behaviour. Attrition during the study (21.9 per cent) was somewhat higher than other online studies that the research team have undertaken. The majority of dropouts occurred, however, on the first task where participants were asked to complete a diary entry about the previous day. This task preceded the page that informed participants that the study was about climate change. Hence, while the results may be somewhat biased by a willingness to complete the sorts of survey questions posed here, there is unlikely to be a bias to those most interested in a study about climate change. In addition, our sample frame means that the 7 per cent of the population who have no access to the internet are not represented. Minority groups with insufficient levels of English and other groups who struggle to read and write are also excluded from the sample frame. Hence, our findings generalise only to members of the public with internet access and a level of English that allows them to take part in studies such as this.

Our methodological approach also carries some limitations. While open text responses overcome limitations of standard surveys, such that responses are not biased by pre-set options, they are limited by respondents' knowledge. For example, while we elicited difficulties to behaviour change that participants themselves perceive, an assumption here is that these perceptions are accurate. Moreover, respondents could not include impediments to behaviour change that they themselves are not aware of. Psychological characteristics, such as one's held identity, are strongly linked to behaviour but may be unlikely to be generated as an impediment to behaviour change (e.g. Wolstenholme et al., 2021). Hence further research, including controlled diagnostic experiments, is warranted to establish the findings reported here and to test for other perceived difficulties to transport and diet change.

4.6 CONCLUSION

Explaining the discrepancy between climate action attitudes among the general public and continued engagement in high-emission behaviours is not straightforward. The breadth and complexity of climate action makes it necessary to consider each action individually. By investigating two such actions – choices of

[17] This information may also incorporate nutritional advice, such as how to achieve similar protein targets as outlined in footnote 1.

transport and diet – we observe that the issues impeding behaviour change are different and suggest a level of consistency between attitudinal surveys and observed behaviour. For example, it is entirely reasonable to view individual climate action as necessary but continue to travel by car where there is no alternative. Is it also entirely reasonable to view individual climate action as necessary but continue to eat high levels of red meat when unaware of the climate impact of doing so. The evidence generated here contributes some of the necessary 'diagnostic' evidence to help to inform interventions to facilitate behaviour change (Lunn, 2019). Some interventions may benefit from applying this evidence to widely used behaviour change frameworks, such as Rare's Levers of Behaviour Change or the Behaviour Change Wheel (e.g. Michie et al., 2011) before testing their efficacy. In general, policy to support climate action can make use of evidence, such as that generated here, that locates the specific issues preventing more rapid behaviour change.

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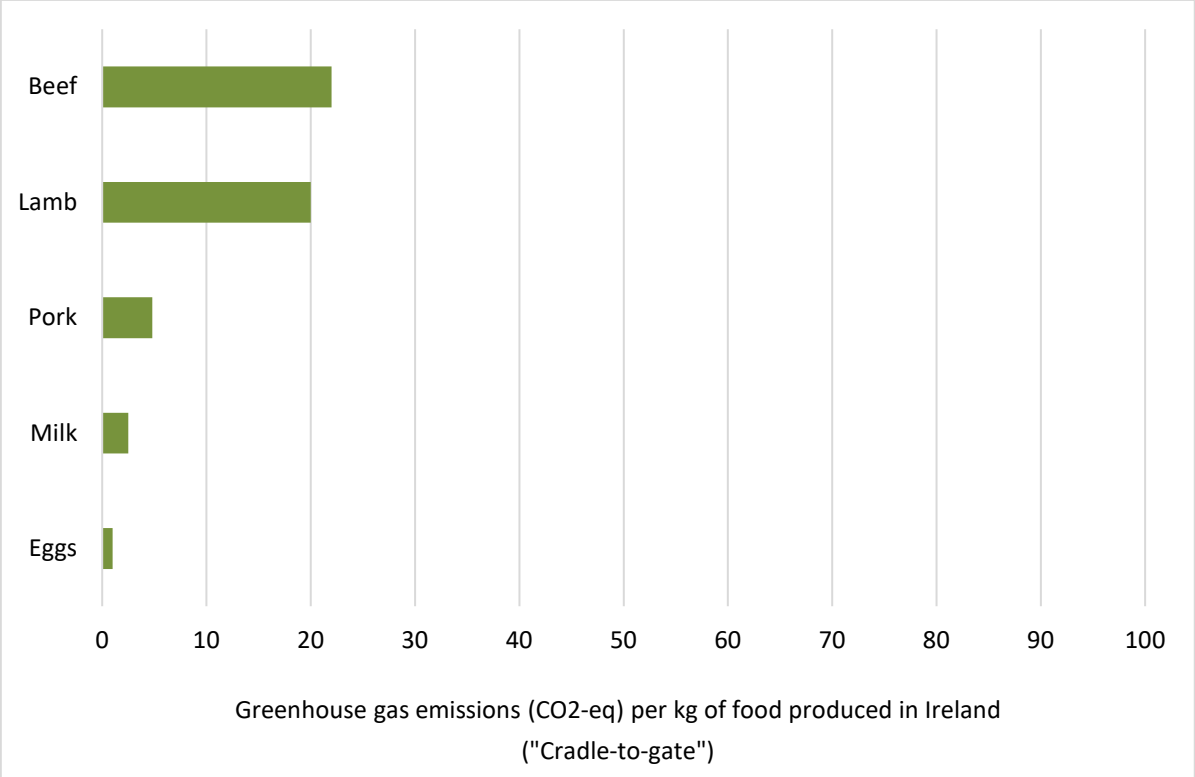
APPENDIX A:

Food produced in Ireland

FIGURE A.1 GREENHOUSE GAS EMISSIONS OF FOOD TYPES (IRISH ESTIMATES)



Source: Weiss and Leip (2012).

APPENDIX B

Survey materials

SECTION A. DAY RECONSTRUCTION METHOD

Page 1

In this study, we're interested in the kinds of day-to-day activities people in Ireland do.

All responses you give will be completely anonymous. Please try to answer as honestly as you can – the more accurate your answers, the more helpful they will be.

Page 2

We would like to learn more about your day yesterday. Not all days are the same. We are only asking you about **yesterday**.

Because people can find it difficult to remember what happened yesterday, we'd first like you to go back through what your day was like. Think of your day as a series of scenes or episodes in a film, or as if you wanted to write down what you did in a diary.

You will see three text boxes on the next screen, one each for the **morning**, the **afternoon**, and the **evening**. Please write a couple of sentences in each box about what you did.

What you write only has to make sense for you. This will help you remember and describe what happened during your day yesterday.

Are you ready to start completing your diary? Then press next below.

Page 3

Thinking about yesterday **morning** (from when you woke up until lunchtime), what kinds of things did you do? Please go through your morning thinking about the very first thing you did, the next thing you did and so on, from the time you woke up until lunch. Write a few sentences in the box below.

[open text]

Now, thinking about yesterday **afternoon** (from lunchtime until dinnertime), what kind of things did you do? Please go through your afternoon thinking about the very first thing you did, the next thing you did and so on, from lunch to 6:00 pm. Write a few sentences in the box below.

[open text]

Now, thinking about yesterday **evening** (from dinnertime until you went to bed), what kind of things did you do? Please go through your evening thinking about the very first thing you did, the next thing you did and so on, from 6:00 pm until you went to bed. Write a few sentences in the box below.

[open text]

Page 4

- Would you say yesterday was a usual [insert previous day] for you?
  - ✓ Yes
  - ✓ No

If 'No' is chosen:

Page 5

- What made yesterday an unusual [insert previous day] for you?

[open text]

SECTION B. AWARENESS

Page 1

Now we are going to show you what you said you did in each part of the day and ask you some more questions about each activity. Please read the instructions carefully, because this part of the study is linked to the raffle for **one of three €100 Mastercard vouchers**.

Page 2

Below is what you said you did yesterday:

[Answers from DRM re-shown, separated by stage of day]

This part of the study is linked to the raffle for €100 Mastercard vouchers – please read the instructions carefully.

We are interested in the things you did that you think mattered most for your **carbon footprint**. Your carbon footprint for yesterday refers to the total emissions of carbon dioxide and other greenhouse gases that resulted from actions you took or products you bought yesterday.

Some things might have been necessary for you to do – that's fine. Please just tell us what you think contributed most to your carbon footprint. This can be anything you did, even if you didn't write about it in the previous section.

Of the things you did yesterday, what do you think mattered most for your **carbon footprint**? Please write one thing in each box below.

For each correct action you list, you will earn another entry into the raffle for the €100 Mastercard voucher.

- Yesterday, the things that mattered most for my carbon footprint were…
  - ✓ [When I…]
  - ✓ [When I…]
  - ✓ [When I…]
- I can't think of anything that I did during the day that mattered for my carbon footprint.

SECTION C. BEHAVIOUR QUESTIONS

Page 1

We will now ask you some additional questions about the things you did yesterday. Please respond as accurately as you can to all the questions. We will start with yesterday **morning**.

Page 2

Below is what you said you did yesterday **morning**:

➢ [Answers from Morning DRM re-shown]

- Did you do any of the following yesterday morning? Select from the list below which of these you did.

  - ✓ Had a meal or a snack
  - ✓ Went from one place to another (e.g. from home to a shop, or from work to the park)
  - ✓ None of the above

If 'Had a meal or a snack':

Page 3

- Did you eat or drink any of the following yesterday morning? Select all that apply.

✓ Milk or butter
✓ Eggs
✓ Cheese
✓ Beef or lamb
✓ Other meat (e.g. pork, chicken, game)
✓ Fish and seafood
✓ None of the above

If 'Went from one place to another…':

Page 4

- You said that you went somewhere yesterday morning. What modes of transport did you use? Select all that apply.

✓ Private car, van (as driver or passenger) or motorcycle
✓ Bus
✓ Train or Luas
✓ Taxi
✓ Bike
✓ Scooter
✓ Walking
✓ Other
✓ None of the above

If 'Private car…' or 'Taxi':

Page 5

- You said that you went somewhere yesterday **morning** as a driver or passenger in a private car, taxi or on a motorcycle. What was the **shortest** distance you travelled in one full journey (to get from A to B)? If you made many journeys yesterday **morning**, please just think about the shortest one you did by car, taxi or motorcycle?

✓ Less than 2km
✓ 2km – 3.99km
✓ 4km – 5.99km
✓ 6km – 7.99km
✓ 8km or more
✓ Not sure

[Repeat Behaviour Questions for Afternoon and Evening]

SECTION D. STAGE OF CHANGE

Page 1

Next, we have some questions about your opinion of what you eat **in general**. There are no right or wrong answers – please just answer as honestly as possible.

Page 2 [DIET]

- In a typical week, on how many days do you eat beef or lamb?
  - ✓ I do not eat beef or lamb
  - ✓ Less than once a month
  - ✓ Less than 1 day a week (e.g. once every two weeks, once a month)
  - ✓ 1
  - ✓ 2
  - ✓ 3
  - ✓ 4
  - ✓ 5
  - ✓ 6
  - ✓ 7

- In a typical week, on how many days do you eat other meat (e.g. pork, chicken)?
  - ✓ I do not eat other meat (e.g. pork or chicken)
  - ✓ Less than once a month
  - ✓ Less than 1 day a week (e.g. once every two weeks, once a month)
  - ✓ 1
  - ✓ 2
  - ✓ 3
  - ✓ 4
  - ✓ 5
  - ✓ 6
  - ✓ 7

- In a typical week, on how many days do you eat fish or seafood?
  - ✓ I do not eat fish or seafood
  - ✓ Less than once a month
  - ✓ Less than 1 day a week (e.g. once every two weeks, once a month)
  - ✓ 1
  - ✓ 2
  - ✓ 3
  - ✓ 4
  - ✓ 5
  - ✓ 6
  - ✓ 7

- In a typical week, on how many days do you eat cheese?

✓ I do not eat cheese
✓ Less than once a month
✓ Less than 1 day a week (e.g. once every two weeks, once a month)
✓ 1
✓ 2
✓ 3
✓ 4
✓ 5
✓ 6
✓ 7

Page 3

- Have you ever made any changes to your diet to reduce your carbon footprint?

✓ Yes
✓ No

If 'Yes':

Page 4

- What changes did you make to your diet to reduce your carbon footprint? Select all that apply.

✓ Drink less milk or eat less butter
✓ Eat fewer eggs
✓ Eat less cheese
✓ Eat less beef
✓ Eat less lamb
✓ Eat less other meat (e.g. pork, chicken, game)
✓ Eat less fish and seafood
✓ Eat more organic food
✓ Eat more local food
✓ Something else (please describe)

- Which of the following best describes how you feel about the changes you made to your diet to reduce its carbon footprint?

✓ I am satisfied with my current diet
✓ I would like to make even more changes
✓ I am finding the changes difficult to maintain
✓ I found the changes too difficult to maintain

If 'No':

Page 4

- Which of the following best describes how you feel about your current diet?

✓ I do not see any need to change my diet to reduce my carbon footprint
✓ I would like to make changes to my diet to reduce my carbon footprint but at the moment feel it is not possible for me
✓ I plan to make changes to my diet to reduce my carbon footprint in the near future

Page 5 [TRANSPORT]

Next, we have some questions about your opinion of how you get around **in general**. There are no right or wrong answers – please just answer as honestly as possible.

- What type of car (or van or motorcycle) do you primarily drive?

✓ Petrol
✓ Diesel
✓ Full electric
✓ Plug-in hybrid (petrol or diesel)
✓ I do not drive

- In a typical week, on how many days do you travel by private vehicle (e.g. car) for at least one journey (either as a passenger or driver)?

✓ I never travel by private vehicle (e.g. driving, taxi)
✓ Less than once a month
✓ Less than 1 day a week (e.g. once every two weeks, once a month)
✓ 1
✓ 2
✓ 3
✓ 4
✓ 5
✓ 6
✓ 7

- In a typical week, on how many days do you cycle or use a scooter for at least one journey?

✓ I do not cycle or use a scooter
✓ Less than once a month
✓ Less than 1 day a week (e.g. once every two weeks, once a month)
✓ 1
✓ 2
✓ 3
✓ 4
✓ 5
✓ 6
✓ 7

- In a typical week, on how many days do you walk or go by wheelchair for at least one journey?

✓ I never walk or go by wheelchair for my journeys
✓ Less than once a month
✓ Less than 1 day a week (e.g. once every two weeks, once a month)
✓ 1
✓ 2
✓ 3
✓ 4
✓ 5
✓ 6
✓ 7

- To prove you are not a bot, please select '6' – otherwise the survey will end.

✓ I never use the internet
✓ Less than once a month
✓ Less than 1 day a week (e.g. once every two weeks, once a month)
✓ 1
✓ 2
✓ 3
✓ 4
✓ 5
✓ 6
✓ 7

- In a typical week, on how many days do you travel by public transport for at least one journey?

✓ I never travel by public transport
✓ Less than once a month
✓ Less than 1 day a week (e.g. once every two weeks, once a month)
✓ 1
✓ 2
✓ 3
✓ 4
✓ 5
✓ 6
✓ 7

Page 6

- Have you ever made any changes to how you get around/travel day-to-day to reduce your carbon footprint?

✓ Yes
✓ No

If 'Yes':

Page 7

- What changes did you make to your how you get around day-to-day to reduce your carbon footprint? Select all that apply.

✓ Drive less or car-share
✓ Cycle, use a scooter or walk more
✓ Use public transport (e.g. bus, train, Luas) more often
✓ Bought a hybrid vehicle
✓ Bought an electric vehicle (e.g. a car)
✓ Take fewer flights
✓ Something else (please describe)

- Which of the following best describes how you feel about the changes you made to how you get around/travel?

  ✓ I am satisfied with how I currently get around/travel day-to-day
  ✓ I would like to make even more changes
  ✓ I am finding the changes difficult to maintain
  ✓ I found the changes too difficult to maintain

If 'No':

Page 7

- Which of the following best describes how you feel about how you get around/travel?

  ✓ I do not see any need to change how I get around/travel to reduce my carbon footprint
  ✓ I would like to make changes to how I get around/travel to reduce my carbon footprint but at the moment feel it is not possible for me
  ✓ I plan to make changes to how I get around/travel to reduce my carbon footprint in the near future

SECTION E. DIFFICULTIES

Page 1

If TRANSPORT Stage of Change is 'I would like to make changes to how I get around/travel to reduce my carbon footprint but at the moment feel it is not possible for me':

You said that you would like to change your **transport behaviour** to reduce your carbon footprint (but, at the moment, it is not possible for you to do so). We are interested in why making this change is difficult for you. Please list here any reason **why you find it difficult to change your transport behaviour to reduce your carbon footprint.** The reasons can be something outside your control or something that is specific to you.

[open text]

If TRANSPORT Stage of Change is 'I plan to make changes…':

You said that you plan to change your **transport behaviour** to reduce your carbon footprint. We are interested in any reason why making this change might be difficult for you. Please list here any reason **why you might find it difficult to change your transport behaviour to reduce your carbon footprint.** The reasons can be something outside your control or something that is specific to you.

[open text]

If TRANSPORT Stage of Change is 'I am finding the changes difficult …':

You said that you changed your **transport behaviour** to reduce your carbon footprint but that it is difficult to maintain. We are interested in why this change is difficult for you. Please list here any reason **why you find it difficult to maintain the change to your transport behaviour to reduce your carbon footprint.** The reasons can be something outside your control or something that is specific to you.

[open text]

If TRANSPORT Stage of Change is 'I would like to make even more changes':

You said that you changed your **transport behaviour** to reduce your carbon footprint and you want to change even more. We are interested in any reason why making this change might be difficult for you. Please list here any reason **why you might find it difficult to change your transport behaviour to reduce your carbon footprint.** The reasons can be something outside your control or something that is specific to you.

[open text]

If TRANSPORT Stage of Change is 'found the changes too difficult':

You said that you changed your **transport behaviour** to reduce your carbon footprint but that it was too difficult to maintain. We are interested in why it was too difficult for you to make this change. Please list here any reason **why you found it too difficult to maintain the change to your transport behaviour to reduce your carbon footprint.** The reasons can be something outside your control or something that is specific to you.

[open text]

[open text x3 with additional 3 potentially added]

Same for DIET with order counterbalanced

SOCIO-DEMOGRAPHIC QUESTIONS

Thank you for your responses so far. Please answer the following questions about yourself. Remember that all responses are anonymous – it will not be possible to identify you individually.

Page 1

- What is your gender?
  - ✓ Male
  - ✓ Female
  - ✓ Non-binary
  - ✓ Prefer not to say

- How old are you (in years)?
  - Please Select...

- Where were you born?
  - ✓ Ireland
  - ✓ Other (please specify)

- What is your ethnicity?
  - ✓ White Irish
  - ✓ White Irish Traveller
  - ✓ Any other White background
  - ✓ Black or Black Irish – African
  - ✓ Black or Black Irish – Any other Black background
  - ✓ Asian or Asian Irish – Chinese
  - ✓ Asian or Asian Irish – Any other Asian background
  - ✓ Other incl. mixed background

Page 2

- What county do you live in?
  - Please Select...

- Which of the following best describes the area you live in?
  - ✓ Urban
  - ✓ Rural

- How many people, including yourself, live in your household?
  - Please Select...

- Are there any children under the age of 18 living in your household?
  - ✓ Yes
  - ✓ No

Page 3

- What is your highest level of educational attainment?

  Please Select...

- Please indicate to which occupational group the Chief Income Earner in your household belongs, or which group fits best. If the Chief Income Earner is retired, or is not in paid employment but has been out of work for less than 6 months, please answer for their most recent occupation.

  Please Select...

- What is your current employment status?

  Please Select...

APPENDIX C

Additional analyses

TABLE A.1 REGRESSION MODELS PREDICTING EVERYDAY TRANSPORT MODES (ODDS RATIOS)

		Private Vehicle	Public Transport	Cycling	Walking
Gender *(Ref: Woman)*	Man	1.04 (0.11)	0.88 (0.14)	2.55*** (0.58)	0.91 (0.12)
Age *(Ref: 18 – 29 years)*	40-59 years	1.69*** (0.21)	0.42*** (0.08)	0.53* (0.14)	0.86 (0.13)
	60+ years	2.08*** (0.32)	0.41** (0.09)	0.56† (0.17)	0.97 (0.19)
Educational Attainment *(Ref: Leaving Certificate or below)*	Tertiary Education below degree	1.15 (0.15)	0.77 (0.17)	1.41 (0.40)	1.13 (0.18)
	Degree or above	1.22 (0.16)	1.52* (0.26)	1.35 (0.37)	1.20 (0.19)
Employment Status (*Ref*: *Not working)*	Working (full- or part-time, incl. self-employed)	2.14*** (0.26)	0.62 (0.12)	0.95 (0.24)	0.84 (0.13)
Living Area *(Ref: Rural)*	Urban	0.63*** (0.07)	2.57*** (0.53)	1.52 (0.39)	2.68*** (0.38)
Region *(Ref: Dublin)*	Rest of Leinster	1.96*** (0.30)	0.21*** (0.05)	0.65 (0.19)	0.58** (0.11)
	Munster	1.91*** (0.29)	0.24*** (0.05)	0.64 (0.19)	0.82 (0.16)
	Connacht/Ulster	1.62*** (0.28)	0.37*** (0.09)	0.84 (0.27)	1.05 (0.23)
Country of Birth *(Ref: Outside Ireland)*	Ireland	2.01*** (0.27)	1.19 (0.24)	0.57* (0.14)	1.01 (0.17)
Child at Home *(Ref: No)*	Yes	2.31*** (0.28)	0.53** (0.10)	1.01 (0.24)	0.74* (0.11)
N		1,200	1,200	1,197	1,200

Source: Authors' analysis.

Note: †$p < .10$; *$p < .05$; **$p < .01$; ***$p < .001$. Private vehicle is modelled using an ordinal logistic regression whereas others are logistic regressions. The public transport, cycling and walking models predict taking at least one journey week by that mode in a typical week. Total N is below 1,200 in models where all three non-binary individuals gave the same response (e.g. never cycling).

TABLE A.2 REGRESSION MODELS PREDICTING HIGH-EMISSION FOOD CONSUMPTION (ODDS RATIOS)

		Beef or Lamb	Other Meat	Cheese
Gender *(Ref: Woman)*	Man	2.03*** (0.22)	1.53*** (0.16)	0.98 (0.10)
Age *(Ref: 18 – 29 years)*	40-59 years	0.89 (0.11)	0.83 (0.10)	0.90 (0.11)
	60+ years	1.44* (0.22)	0.50*** (0.08)	0.75† (0.11)
Educational Attainment *(Ref: Leaving Certificate or below)*	Tertiary Education below degree	1.28† (0.16)	1.25† (0.16)	1.29† (0.17)
	Degree or above	1.31* (0.17)	1.12 (0.14)	1.12 (0.14)
Employment Status (*Ref*: *Not working)*	Working (full- or part-time, incl. self-employed)	1.18 (0.14)	1.02 (0.12)	0.91 (0.11)
Living Area *(Ref: Rural)*	Urban	0.90 (0.10)	1.20 (0.14)	0.98 (0.11)
Region *(Ref: Dublin)*	Rest of Leinster	0.89 (0.13)	1.45* (0.22)	1.02 (0.15)
	Munster	1.05 (0.16)	1.29† (0.19)	1.11 (0.17)
	Connacht/Ulster	0.91 (0.16)	1.05 (0.18)	0.97 (0.16)
Country of Birth *(Ref: Outside Ireland)*	Ireland	1.13 (0.15)	1.38* (0.19)	1.00 (0.13)
Child at Home *(Ref: No)*	Yes	1.41** (0.17)	1.00 (0.12)	1.22† (0.14)
N		1,200	1,200	1,200

Source: Authors' analysis.

Note: †$p < .10$; *$p < .05$; **$p < .01$; ***$p < .001$. For beef and lamb, low cell sizes at the upper end of the scale were combined to a '5 days or more' category. All models are ordinal logistic regressions.

TABLE A.3 LOGISTIC REGRESSION MODELS PREDICTING BEHAVIOUR IDENTIFICATION (ODDS RATIOS)

		Transport	Energy	Waste	Diet	Other Food
Gender *(Ref: Woman)*	Man	1.01 (0.13)	1.16 (0.14)	0.60** (0.11)	0.99 (0.33)	1.20 (0.25)
Age *(Ref: 18 – 29 years)*	40-59 years	1.03 (0.15)	0.98 (0.14)	1.21 (0.24)	0.62 (0.24)	0.74 (0.18)
	60+ years	0.99 (0.18)	1.39† (0.24)	1.13 (0.29)	0.49 (0.25)	0.78 (0.23)
Educational Attainment *(Ref: Leaving Certificate or below)*	Tertiary Education below degree	1.18 (0.18)	1.10 (0.17)	1.08 (0.24)	0.85 (0.38)	1.91* (0.56)
	Degree or above	1.43* (0.22)	1.14 (0.17)	1.31 (0.28)	1.02 (0.41)	2.81*** (0.78)
Employment Status (*Ref: Not working)*	Working (full- or part-time, incl. self-employed)	1.49** (0.21)	0.97 (0.13)	1.25 (0.26)	2.04 (0.90)	0.61 (0.15)
Living Area *(Ref: Rural)*	Urban	0.88 (0.12)	0.95 (0.13)	1.19 (0.23)	0.72 (0.28)	1.28 (0.30)
Region *(Ref: Dublin)*	Rest of Leinster	0.86 (0.15)	0.98 (0.17)	1.16 (0.28)	0.55 (0.25)	0.84 (0.24)
	Munster	0.98 (0.18)	1.41* (0.24)	1.02 (0.25)	0.66 (0.28)	0.99 (0.27)
	Connacht/Ulster	0.86 (0.18)	1.03 (0.20)	0.92 (0.26)	0.14* (0.11)	0.79 (0.26)
Country of Birth *(Ref: Outside Ireland)*	Ireland	1.33† (0.21)	0.87 (0.14)	1.01 (0.22)	2.70 (1.65)	1.56 (0.47)
Child at Home *(Ref: No)*	Yes	1.33* (0.19)	1.14 (0.15)	0.76 (0.15)	0.68 (0.25)	0.91 (0.21)
Constant		1.01 (0.29)	1.05 (0.29)	0.13 (0.05)	0.03 (0.03)	0.05 (0.03)
N		1,197	1,200	1,200	1,197	1,200

Source: Authors' analysis.

Note: †$p < .10$; *$p < .05$; **$p < .01$; ***$p < .001$. Sample size in some models is below 1,200 because all three non-binary individuals gave the same response.

TABLE A.4 LOGISTIC REGRESSION MODELS PREDICTING TRANSPORT BEHAVIOUR CHANGE (ODDS RATIOS)

		Any Change	Driving Less	Walk/Cycle More	More Public Transport
Gender *(Ref: Woman)*	Man	0.94 (0.12)	0.84 (0.12)	1.00 (0.18)	0.88 (0.16)
Age *(Ref: 18 – 29 years)*	40-59 years	1.19 (0.17)	1.04 (0.19)	1.22 (0.25)	0.71 (0.16)
	60+ years	1.59* (0.29)	1.26 (0.27)	0.77 (0.21)	1.29 (0.31)
Educational Attainment *(Ref: Leaving Certificate or below)*	Tertiary Education below degree	1.19 (0.19)	1.21 (0.22)	0.72 (0.17)	0.94 (0.23)
	Degree or above	1.62** (0.25)	1.21 (0.22)	1.16 (0.25)	2.16** (0.47)
Employment Status (*Ref: Not working)*	Working (full- or part-time, incl. self-employed)	0.79 (0.11)	0.58 (0.10)	0.90 (0.19)	0.77 (0.16)
Living Area *(Ref: Rural)*	Urban	1.40* (0.19)	1.28 (0.21)	1.43† (0.30)	1.28 (0.27)
Region *(Ref: Dublin)*	Rest of Leinster	0.69* (0.12)	0.79 (0.17)	0.55* (0.14)	0.35*** (0.09)
	Munster	0.88 (0.15)	1.08 (0.22)	0.68† (0.16)	0.45** (0.11)
	Connacht/Ulster	0.66* (0.13)	0.98 (0.23)	0.52* (0.15)	0.48** (0.13)
Country of Birth *(Ref: Outside Ireland)*	Ireland	1.08 (0.17)	0.98 (0.19)	0.89 (0.20)	0.98 (0.23)
Child at Home *(Ref: No)*	Yes	0.97 (0.14)	0.89 (0.15)	0.85 (0.17)	0.68† (0.15)
Constant		0.50 (0.14)	0.50 (0.17)	0.22 (0.09)	0.27 (0.11)
N		1,200	1,000	1,197	1,200

Source: Authors' analysis.
Note: †$p < .10$; *$p < .05$; **$p < .01$; ***$p < .001$. Sample size in some models is below 1,200 because all three non-binary individuals gave the same response. The model for driving less excludes non-drivers.

TABLE A.5 LOGISTIC REGRESSION MODELS PREDICTING FOOD BEHAVIOUR CHANGE (ODDS RATIOS)

		Any Change	Less Beef/Lamb	More Local	Less Dairy	Less Other Meat
Gender *(Ref: Woman)*	Man	0.64** (0.09)	0.58** (0.09)	0.54** (0.10)	0.77 (0.15)	0.48*** (0.09)
Age *(Ref: 18 – 29 years)*	40-59 years	0.93 (0.15)	1.09 (0.20)	0.84 (0.17)	0.72 (0.16)	1.04 (0.22)
	60+ years	1.01 (0.20)	1.15 (0.26)	1.12 (0.29)	0.48* (0.21)	0.73 (0.21)
Educational Attainment *(Ref: Leaving Certificate or below)*	Tertiary Education below degree	1.57** (0.27)	1.29 (0.26)	1.38 (0.31)	1.55† (0.38)	0.95 (0.23)
	Degree or above	1.75** (0.30)	1.56* (0.30)	1.58* (0.34)	1.29 (0.32)	1.49† (0.34)
Employment Status (*Ref: Not working)*	Working (full- or part-time, incl. self-employed)	0.98 (0.15)	1.04 (0.19)	1.10 (0.22)	0.82 (0.18)	1.00 (0.34)
Living Area *(Ref: Rural)*	Urban	1.14 (0.17)	1.10 (0.19)	0.96 (0.18)	1.40 (0.31)	1.09 (0.23)
Region *(Ref: Dublin)*	Rest of Leinster	1.06 (0.21)	0.86 (0.19)	1.01 (0.26)	1.09 (0.31)	0.86 (0.24)
	Munster	1.32 (0.25)	1.08 (0.23)	1.18 (0.29)	1.45 (0.39)	1.24 (0.32)
	Connacht/Ulster	1.22 (0.27)	1.08 (0.26)	1.24 (0.34)	1.25 (0.39)	0.98 (0.30)
Country of Birth *(Ref: Outside Ireland)*	Ireland	1.04 (0.18)	1.23 (0.26)	0.90 (0.20)	0.82 (0.20)	1.23 (0.31)
Child at Home *(Ref: No)*	Yes	0.86 (0.13)	0.77 (0.14)	1.03 (0.20)	0.72 (0.16)	0.77 (0.16)
Constant		0.27 (0.08)	0.18 (0.06)	0.16 (0.06)	0.14 (0.05)	0.14 (0.06)
N		1,197	1,197	1,197	1,197	1,197

Source: Authors' analysis.

Note: †$p < .10$; *$p < .05$; **$p < .01$; ***$p < .001$. Sample size in some models is below 1,200 because all three non-binary individuals gave the same response.

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