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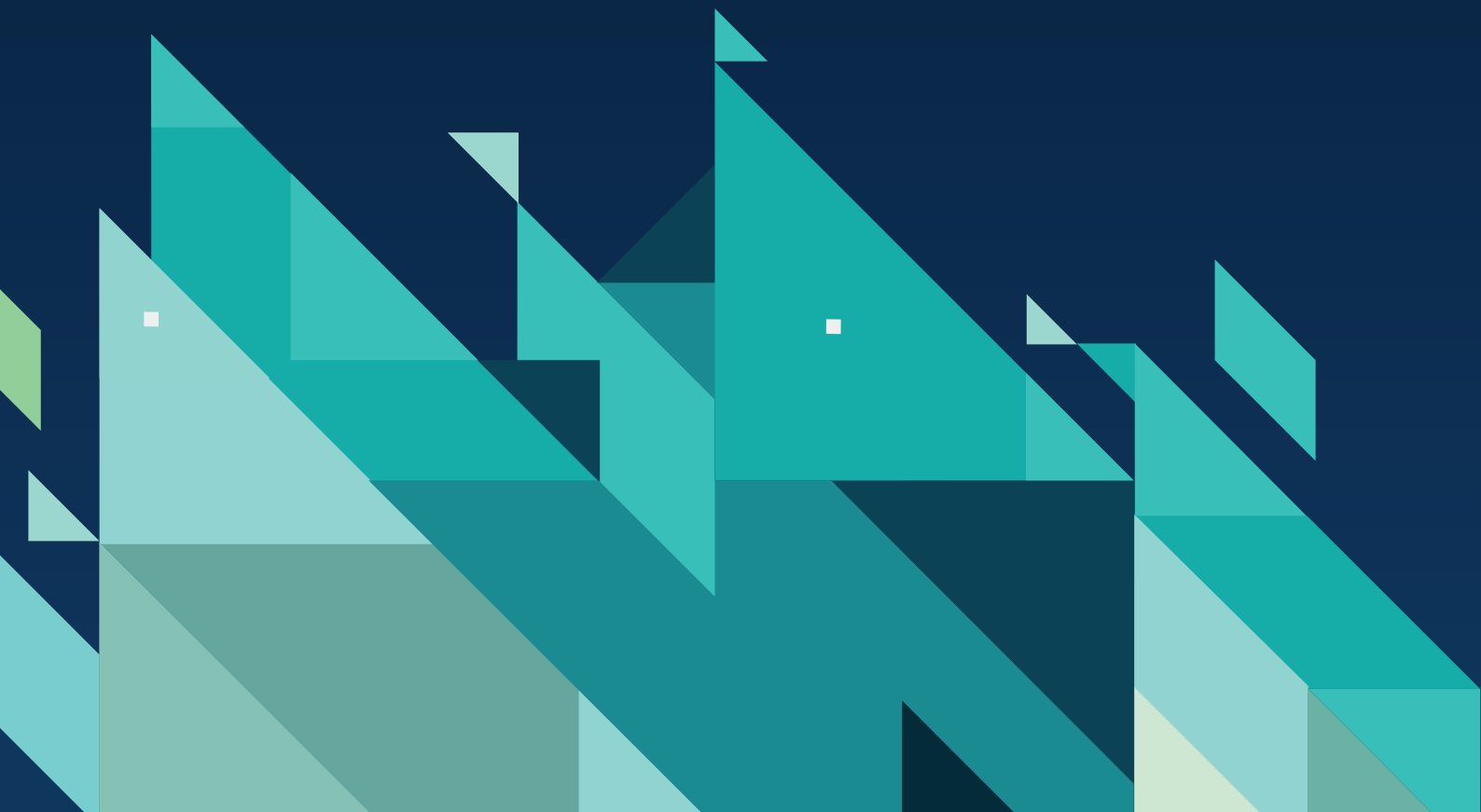
Perceptions of climate change and policy among farmers and the public in Ireland

LUCIE MARTIN, ADAM JOACHIM SHIER, YLVA ANDERSSON, SHANE TIMMONS, DEIRDRE ROBERTSON AND PETE LUNN



PERCEPTIONS OF CLIMATE CHANGE AND POLICY AMONG FARMERS AND THE PUBLIC IN IRELAND

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ABBREVIATIONS

EPA	Environmental Protection Agency
GHG	Greenhouse gas
HEG	Healthy eating guidelines

EXECUTIVE SUMMARY

This study investigates how farmers, rural residents, and urban residents compare when it comes to perceptions and understanding of climate change, as well as willingness to make changes in their lives to reduce greenhouse gas (GHG) emissions. The study takes place in a context where there is an urgent need to act together to reduce GHG emissions across multiple sectors of the economy, yet any real or perceived divisions in society – between farmers and non-farmers, between rural and urban residents – can threaten collective action to curb climate change.

The study has two primary motivations. First, making progress on reducing GHG emissions from agriculture is particularly important in Ireland, because emissions from agriculture are higher than those of any other sector (Environmental Protection Agency, 2024a). Ireland produces more than twice the agricultural emissions per capita of any other European Union country. Second, the success of climate policy depends heavily on people's willingness to engage in collective action, but divisions between social groups (or perceptions thereof) can threaten this willingness. Thus, disagreement between groups about the nature of the collective challenge and the science behind it needs to be avoided. Accurate measures of how people in different social groups view climate change and policy can help to identify and, hopefully, correct misperceptions and misunderstandings that have the potential to cause conflict.

THE SURVEY

The full study sample was 1,667 adults in Ireland, consisting of 467 farmers and 1,200 members of the general public, split evenly between rural and urban participants. The farmer sample was recruited via multiple channels to increase diversity and representativeness, particularly with respect to geographic location and farm type. A detailed comparison between the sample and the Census of Agriculture is provided in the body of the report (Section 2.2), which also describes multiple checks and additional analyses undertaken to ensure that the reported findings are robust to possible sample biases.

The survey asked how willing people are to take different kinds of actions to help reduce climate change, how concerned they are about climate change, how concerned they think others are and how they perceive different climate policies. We tested understanding of climate change through a series of multiple choice questions, for which participants were rewarded with raffle tickets for correct answers. We asked the whole sample what they perceived to be the most important issues facing farmers. For the farmers in the sample, the survey also included questions about current farming practices.

MAIN RESULTS

Knowledge about climate change

There was no overall difference in knowledge about the broad causes and effects of climate change between farmers and non-farmers, nor between rural and urban residents. Any differences with respect to specific factual questions were very small (0.15 standard deviations or lower). More than one-third of all respondents – including both farmers and the public, and both rural and urban residents – failed to identify agriculture as one of the three sectors of the Irish economy that generate the most GHG emissions (out of a list of six), despite the fact that it is the highest emitting sector by a significant margin.

Understanding of which everyday behaviours generate the most emissions was generally poor, but lower among farmers. For example, most participants incorrectly believed that switching to a hybrid car has a larger impact on personal emissions than switching to a plant-based diet (impact estimates were based on Wynes and Nicholas' 2017 study, which uses global data adjusted for local conditions). Incorrect responses to this specific question were significantly higher among farmers (80% compared to 60–63% of the urban and rural public, respectively) and among beef and dairy farmers in particular. This may reflect some 'motivated reasoning', given the relevance of this question for livestock farming.

Concern about climate change

Climate change was selected by 43% of farmers as one of the three most important issues they face out of a list of eight. It ranked similarly to negative perceptions of farming (45%), above high workload (29%) but below financial challenges (73%) and excessive regulation (58%). The public rated it as the second most important issue facing farming, after financial challenges, while few identified negative perceptions of farming as an issue.

Farmers, rural residents, and urban residents all reported high levels of general worry about climate change, and we found no significant differences between these groups in the extent of this worry. Non-farmers underestimated how worried farmers are about climate change, relative to how farmers judged themselves and their peers. People generally assumed that their peers were less worried than they themselves are.

Willingness to take action

Most farmers reported being relatively conscious of climate change when making decisions about how they farm, with the majority saying that they consider the climate in their farming decisions (57% chose a rating above the midpoint on a scale from 'not at all' to 'very much'). Two-thirds of farmers said they are more likely than not to change how they farm in the future to help stop climate change, with fewer than one in seven saying that they are unlikely to. However, when asked about 13 farming practices that help mitigate climate change, the average farmer

was unaware of more than five of them.

We again recorded no significant differences between farmers, rural residents, and urban residents in general willingness to make lifestyle changes to help mitigate climate change. When presented with examples such as flying less, eating less meat, going car-free, and improving home energy efficiency, the majority of participants in all three groups indicated a general willingness to make changes to their lifestyle to help reduce climate change (59% of farmers, 65% of the rural public, and 66% of the urban public).

Both with respect to farming practices and general lifestyle changes, people were inclined to believe that they are more willing than others to make changes for the sake of the climate. Non-farmers were more pessimistic than farmers about others' likelihood of changing their lifestyle or farming practices to help stop climate change.

Support for climate policies

Participants rated their support for 12 policies designed to mitigate climate change – a mixture of policies related and unrelated to agriculture. In general, there was modest support for pro-climate policies, with no significant differences between farmers, rural residents and urban residents. The most supported policies were those involving subsidies and service provision (e.g. home retrofit grants, assistance for farmers to adopt greener technology); the least supported policies were those involving restrictions (e.g. making flights more expensive, reducing the national herd size). A small minority of fewer than 3% of participants was fully opposed to all climate policies. However, more than 30% fully opposed some of the least supported policies (such as reducing the national herd size).

We did find differences between farmers and non-farmers in support for specific agricultural policies. Farmers were more in favour of subsidies for energy-saving technologies on farms, but more strongly opposed to taxing meat or reducing the national herd. They also indicated lower support for subsidising farmers to switch to plant-based farming or forestry.

Support for pro-climate policies was higher among people who are more worried and knowledgeable about climate change. Participants who had better knowledge of which sectors had the highest emissions were most likely to support restrictive pro-climate agricultural policies.

POLICY IMPLICATIONS

Addressing these findings requires development of new policy actions to close knowledge gaps, correct misperceptions and leverage willingness for action.

Knowledge of sectoral GHG emissions and how specific actions contribute to personal emissions is generally poor, among rural residents, urban residents and farmers alike. Better knowledge is also associated with stronger support for pro-climate policies in our analysis. There is thus both scope and motivation for

government and other stakeholders to improve public and farmer engagement with the facts about climate change. A clear statement from the government about the link between diet and emissions is warranted. Ideally, this might include credible and accessible guidance for eating a healthy and sustainable diet, perhaps from the Department of Health, as advised by the Climate Change Advisory Council (2024). A start would be to promote current healthy eating guidelines as not only good for people's health, but also good for reducing the emissions that cause climate change.

People, on average, misperceive how much farmers and their other fellow citizens care about climate change. Most are willing to change their lifestyle to help curb climate change. Asserting the extent of majority support for climate action is likely to be needed in the face of vocal opposition or isolated disputes that attract media attention; not only are climate-resistant views (such as being unconcerned, unwilling to take action, or fully opposed to climate policy in general) held only by a minority, this is true across the social groups studied here. Narratives that seek to exploit climate-resistant views to create a sense of division between urban and rural communities, or between farmers and non-farmers, are not based in fact, at least presently.

Among farmers specifically, there is willingness in principle to adopt climate-friendly farming practices, with opportunities in areas such as green technology uptake and agroforestry (e.g. planting trees on farms), but lower awareness of some high-impact practices (e.g. using protected urea fertiliser). More work is needed to understand how to speed up change, including addressing the financial issues and regulatory and compliance burdens frequently cited by farmers.

CHAPTER 1

Introduction

It is an unpalatable truth that many normal, everyday activities in a developed economy like Ireland's generate emissions that drive climate change. Our individual impact on the climate depends on how we heat our homes, what we eat, the way we travel, how we create our livelihoods and the consumer goods we choose to purchase. In Ireland, we are fortunate, in that these basic facts of climate change are largely undisputed. 'Climate denial' is expressed by only a very small minority, while the large majority of the population express concern about climate change and willingness to act to mitigate it (Leiserowitz et al., 2021; O'Mahony et al., 2024; Timmons and Lunn, 2022).

This report focuses on perceptions of climate change and climate policy specifically in relation to farming, which generates more greenhouse gas emissions than any other sector in Ireland (EPA, 2024a). We compare perceptions across groups, along two boundaries potentially relevant to perceptions of farming and climate change: the boundaries between farmers and non-farmers, and (among non-farmers) the boundary between rural and urban residents. We begin by placing the relevant issues in the broader context of climate change mitigation policy.

1.1 CLIMATE ACTION AS COLLECTIVE ACTION

Given the multiple and diverse sources of greenhouse gas (GHG) emissions causing climate change, reducing emissions is a policy challenge like no other. Ireland's Climate Action Plan 2024 envisages transformative, rapid and simultaneous change across multiple sectors. This requires the coordination of multidisciplinary technical expertise and the efficient allocation of large resources across government bodies, both national and local. In addition to these logistical and financial challenges, there are multiple political challenges. Many of the policies, technical issues and potential solutions within each sector are unique, which means that the impact of climate policy does not fall evenly across the population. For instance, people living in urban areas are affected by substantial changes to transport systems, including the building of active travel infrastructure and changes to public transport routes. Meanwhile, people living in rural areas are more likely to be affected by certain changes to production systems, such as the development of renewable energy infrastructure and promotion of more climate-friendly agriculture. How any one individual experiences climate mitigation policy can depend on where they live, the type of house they live in, the sectors within which family members work, how they travel, and more. Yet acceptance of policies that entail substantive change is likely to depend strongly on whether the relative impacts are perceived as fair (Huber, Wicki and Bernauer, 2019). Where they are not, progress is likely to be slowed by political opposition.

To understand perceptions of fairness and political acceptance of climate action, it is helpful to recognise that mitigation of climate change is a collective action problem. The best collective outcome requires all of us to make changes to our lives, but each of us may face incentives to resist change and to rely on the efforts of others. To solve the problem, we need to act together. Collective action problems have been studied by behavioural scientists for some decades. The factors linked to successful collective action are well understood and there is evidence that they apply to climate-related behaviours (Martin, Timmons and Lunn, 2024). Among other factors, collective action is helped by awareness and communication of the collective situation, by equality (e.g. in resources or in how much people will be impacted by climate change), by the belief that others will play their part, and by leaders who 'walk-the-talk'. One of the strongest factors, however, is group identity. When people trying to solve a collective action problem share a common group identity, they are more likely to cooperate to reach a successful collective outcome (e.g. Ruffle and Sosis, 2006; Goette, Huffman and Meier, 2006). Conversely, collective action is harder when it must cross group boundaries. In other words, the stronger the division between groups, the harder it is to sustain a collective effort.

Translated into climate policy, this implies a need to avoid situations where such policy becomes a flashpoint for conflict between identifiable social groups. For instance, this might be a conflict between drivers and cyclists, between local communities and energy providers, or between businesses and local authorities. For the purposes of the present report, our research focuses on two overlapping boundaries within Ireland. The first is the boundary between residents in rural and urban areas. The second is the boundary between farmers and non-farmers. The study is motivated by Ireland's high level of agricultural GHG emissions, which makes agriculture prominent in national climate policy.

1.2 AGRICULTURAL EMISSIONS

Agriculture is the sector that produces the highest level of GHG emissions in Ireland. For 2023, the Environmental Protection Agency (EPA) recorded that agriculture accounted for 38% of production emissions (EPA, 2024a).[1,2] For comparison, the next highest levels of emissions were from transport (21%) and energy industries (14%). The distribution of emissions by sector in Ireland stands

[1] It is important to distinguish between production emissions and consumption emissions. The former are based on where emissions physically take place, while the latter refer to emissions required to produce a product for consumption in a given location (de Bruin, Değer and Yakut, 2024). Thus, where an exporter in Ireland generates emissions to produce a good that is consumed outside Ireland, the emissions are part of Ireland's national production emissions. Where a consumer purchases an imported product, consumption emissions generated overseas may be 'embedded' in the product, but these would not count towards Ireland's national production emissions. Consequently, the behaviours of consumers in Ireland, such as willingness to purchase lower-emission products, do not always affect national emissions, while the behaviours of people who consume Irish products outside Ireland do.

[2] Figures exclude land use, land-use change and forestry (LULUCF).

out by comparison to the rest of Europe, reflecting the historic importance of agriculture in the Irish economy. Ireland produces more than twice the agricultural emissions per capita of any other European Union country (Luksta et al., 2024).

The fact that Ireland has the highest proportion of emissions from agriculture in the European Union means that Ireland has the potential to demonstrate leadership within Europe and globally in tackling climate change. If Ireland can successfully and substantially reduce GHG emissions from agriculture over the coming years, it will set an example of what can be achieved; if not, this too may have broader implications.

While GHG emissions from agriculture have fallen in the last two years, over the past ten years they have increased, driven by the ongoing expansion of the dairy industry following the end of milk production quotas (EPA, 2023). Almost three-quarters of total agricultural emissions come from livestock, primarily cattle.

1.3 AGRICULTURE IN THE CLIMATE ACTION PLAN

Like other sectors, agriculture is subject to sectoral emissions ceilings within sequential carbon budgets. Ireland's Climate Action Plan 2024 acknowledges that a gap exists between projected agricultural emissions and current targets, noting that the Climate Act requires corrective action to be taken.

The plan lists the government measures designed to reduce GHG emissions from agriculture. These combine applied research, information campaigns and subsidies to promote the take-up of greener agricultural practices and technologies, together with support and incentives for diversification, including moving away from livestock farming. Thus, current policy does not take a regulatory approach to reducing emissions, but seeks to achieve reductions by changing the business decisions and practices of farmers, through a combination of research, knowledge transfer and incentives. In other words, the change sought is voluntary and depends on farmers' willingness to be part of a collective process of emissions reduction.

Given the body of evidence demonstrating the importance of common group identity to collective action, the success of the current approach to reducing GHG emissions in agriculture is likely to depend strongly on the relationships between farmers, government and the broader public. To fully appreciate this, it is important to realise the limits of economic incentives to generate change. People, in general, respond to incentives. However, behavioural economists have documented many circumstances where people make decisions that are not in their own long-term financial interest. Many examples surround situations where decision-makers face trade-offs between immediate costs and future rewards (Gerarden, Newell and Stavins, 2017) or where they feel unfamiliar with the outcomes and experiences involved (Fox and Tversky, 1995). One strong and consistent empirical finding is that people are, in general, resistant to change – a phenomenon known as 'status quo bias' (Samuelson and Zeckhauser, 1988).

Consequently, even in a situation where it is apparent that it is in the long-term financial interest of a farmer to change production or practices, it may still feel like a sacrifice to do so. Given this, whether farmers perceive proposed changes as fair and whether they feel part of a collective effort is likely to matter for whether changes sought by policy are realised or resisted (Lunn, 2024).

1.4 COOPERATION VERSUS CONFLICT

The above analysis implies that if there is division or, worse, political conflict, between farmers, the government and the general public, this is likely to harm progress, with negative implications for Ireland's ability to meet its climate targets. Fortunately, recent statements from farming organisations in Ireland acknowledge not only the importance of climate action but also its nature as a collective action problem that requires everyone's cooperation. For instance, in the statement accompanying its 2023 Farming and Climate Summit, the Irish Farmers Association (IFA) stated that 'IFA recognises the importance of climate action as well as enhancing biodiversity and water quality. Like all citizens, farmers are playing their part to reduce emissions, protect water quality and safeguard biodiversity' (Irish Farmers Association, 2023). Indeed, the collective nature of the policy problem seems increasingly to be appreciated across relevant stakeholders. For instance, the requirement for collective effort is explicitly recognised in both the method and findings of the 2023 report of the National Economic and Social Council (NESC), which places a strong emphasis on dialogue, spreading the opportunities and sharing the costs of the transition in agriculture and land use (NESC, 2023). More broadly, the Sectoral Emissions Ceilings, which limit the GHG emissions generated by each sector of the Irish economy, make explicit the need for everyone, from farmers and builders to consumers and energy providers, to play their part to curb climate change (Government of Ireland, 2022).

However, despite recognition of its importance, the collective effort to reduce GHG emissions faces some threats. One threat comes from the incentives of third parties who may benefit from emphasising disagreement and division. An analysis of climate coverage in Ireland's farming media offers an example. Byrne O'Morain and Robbins (2024) undertook a statistical analysis of reporting on the 2021 Climate Action Plan in three leading print and online farming publications. The researchers recorded how stories were framed and which sources were used. They found that most articles adopted political and economic frames that focused only on narrow impacts, often not even mentioning the rationale behind policies designed to benefit the climate. More than one in five articles explicitly framed the story as one of conflict, based on a battle between personalities or groups, with potential winners and losers. Sources were dominated by politicians and farm organisations, with few other stakeholders quoted. Despite the scientific underpinnings of the climate debate and technical nature of policy interventions, just one independent scientist was featured across the 107 articles.

As well as media organisations, political actors may exploit potential division for their own purposes. One way to do this is to point the finger at climate policy as contributing to a rural-urban divide, while positioning oneself as standing up for the local community in the face of an external threat. There is international evidence that climate policy is increasingly a 'wedge issue' in the context of growing political polarisation (Dickson and Hobolt, 2024), which typically has a geographic component. A rural-urban divide specifically with respect to climate policy has been recorded in some other countries (e.g. Mittenzwei et al., 2023) and had been recognised as a concern within the European Union prior to the widespread protests against EU environmental policies that occurred in early 2024 (Eurofound, 2023). Of course, these protests and the policy concessions that followed are themselves evidence of the potential of division to derail climate policy. Public debate in Ireland frequently assumes that a rural-urban divide in Ireland already exists.

As well as actors who seek to benefit from division, a second threat to collective climate action concerns the erosion of people's common understanding of the situation. In any collective action problem, shared understanding and consistent communication of the collective nature of the challenge faced are important factors in whether people cooperate to enact a solution (Martin, Timmons and Lunn, 2024). For climate change, this means that understanding and communication of the basic underlying science is pivotal. An ever-present threat, therefore, is that the relevant science becomes politicised, undermining the collective basis for action and contributing to division between groups that need to act together.

In this context, some recent developments in relation to agriculture in Ireland are troubling. Collaborations of environmental and medical scientists conclude that one of the most effective ways that individuals can reduce emissions associated with their personal consumption is to eat a healthy diet. For instance, Springmann et al. (2020) analysed the dietary guidelines of 85 different countries, concluding that in every case, meeting existing guidelines would both reduce mortality and lower GHG emissions. In a detailed study of multiple UK data-sets, Scheelbeek et al. (2020) conclude that a very low proportion of the population follow the UK's national guidelines (the Eatwell Guide), but that doing so would reduce premature deaths and GHG emissions, with the largest gains for those eating more fruit and vegetables and reducing their intake of red and processed meat. Other international studies have sought specifically to devise dietary guidelines that are both healthy and sustainable (Willett et al., 2019; Romanello et al., 2023). Yet, in 2023, Ederer et al. published the 'Dublin Declaration', a one-page statement that, firstly, made broad claims about the nutritional and environmental benefits of livestock and, secondly, took the unusual scientific step of inviting scientists to sign in support. Signatories include officials in Ireland from Teagasc and the Department of Agriculture. However, an analysis of the relevant evidence by Krattenmacher et al. (2024) concludes that the Dublin Declaration is 'scientifically problematic' and contains 'academically questionable practices'. These include undisclosed conflicts

of interest, some of which specifically concern Teagasc, which has responsibilities for translating scientific evidence into agricultural practice.[3] These events follow a heavily publicised incident, in 2023, when the IFA successfully pressured the EPA to remove a social media post designed to encourage people to eat less red meat. It is difficult to observe these events without concluding that the science underlying agricultural emissions is being politicised, with potentially damaging effects on collective action to reduce them.

The authors of this present study are behavioural scientists, not environmental or nutritional experts. We nevertheless accept the following as a straightforward scientific question: 'Is eating a more plant-based diet an effective and healthy way to reduce personal GHG emissions?'. Based on papers published in the best peer-reviewed academic journals, there is good evidence that shifting toward more plant-based eating can be beneficial both for sustainability (including via reduced land use requirements) and health (Willett et al., 2019; Scheelbeek et al., 2020; Springmann et al., 2020; Springmann et al., 2021; Romanello et al., 2023; Rulli et al., 2024).

Naturally, there are some complexities in the relationship between changing diet and nutritional health. Nutritional adequacy depends not just on what is removed from the diet but also on how it is replaced (Garnett, 2011; Stubbendorff et al., 2024). For example, red meat has high bio-availability of important micronutrients, such as iron, vitamin B12 and vitamin D (De Smet and Vossen, 2016). Large reductions in meat intake may thus lower intake of such micronutrients (Leonard et al., 2024), unless compensated for by other foods. However, red meat is also high in saturated fat and is classified as 'probably carcinogenic' (Farvid et al., 2021). Some diets designed to be both healthy and sustainable have been criticised for paying insufficient attention to micronutrients and making questionable assumptions when modelling outcomes (e.g. Beal, Ortenzi and Fanzo, 2023; Stanton, 2024).

There is always a danger that such complexities in academic debates mask underlying truths. Looking across the scientific literature, one of these appears to be that, for most people, reducing red meat intake is likely to benefit both the environment and their health. In Ireland, people consume more red meat than is recommended by current HSE dietary guidelines and consuming less of it would reduce their individual contribution to GHG emissions (Davies et al., 2024), just as Springmann et al. (2020) reported for 85 countries internationally. Yet, at present, there is no official guidance in Ireland for eating both healthily and sustainably, or indeed official recognition that following Ireland's current healthy eating guidelines (HEG) is also good for the environment. Davies et al. (2025) provide evidence from a recent intervention study in Ireland. Moving from low adherence with HEG (following zero or one out of six guidelines) to moderate (at least four

[3] See also www.rte.ie/news/business/2024/1231/1488626-dublin-declaration

of the six) is associated with better health outcomes and a reduction in GHG emissions from diet of more than 30%. Davies et al. conclude that 'simply encouraging people to follow HEG will achieve substantial gains towards personal and planetary health'.

The Irish Government's advice on healthy eating does not consider sustainability and views alternative sources of protein as mostly interchangeable.[4] However, at the European level, the final report of the European Commission's *Strategic Dialogue on the Future of EU Agriculture* explicitly links the need to promote healthier and more sustainable diets, on the demand side, with the need to expand plant-based food production within the EU, on the supply side (European Commission, 2024, p.55). Similarly, the most recent report of the UK's Climate Change Council states that a substantial proportion of the reduced GHG emissions on the country's pathway to net zero needs to come from dietary change.[5] Thus, Ireland is presently out of step with these international developments.

1.5 AIMS AND RESEARCH QUESTIONS

Given the policy context outlined in Sections 1.1–1.4, there is a danger that misperceptions and misunderstandings between different social groups damage Ireland's efforts to reduce GHG emissions. In such a context, it is surely helpful to generate objective measures of perceptions and understanding of climate change and climate policy, together with associated attitudes. This is the overarching aim of the current study.

We surveyed samples of urban residents, rural residents and farmers to identify any differences in climate change knowledge, concern, policy perceptions, perceived norms and willingness to change. The study had several aims. First, we set out to compare the climate knowledge of farmers and the rural and urban public, including knowledge of causes and effects of climate change and effective climate actions (e.g. energy efficiency, transport, and dietary choices). Second, we investigated the climate concern of farmers and the rural and urban public, as well as their willingness to take climate action (including, among the farmer sample, awareness of and willingness to adopt green farming practices). We also examined each group's perceptions of others' concern and willingness. Third, we analysed perceptions of climate policies among farmers and the rural and urban public, including policies that target farming. We also tested the role of climate knowledge and concern in policy support.

There is some pre-existing evidence relating to some of these aims. The public generally underestimate the contribution of agriculture to GHG emissions

[4] www2.hse.ie/living-well/healthy-eating/how-to-eat-well
[5] www.theccc.org.uk/publication/the-seventh-carbon-budget

(Timmons and Lunn, 2022; O'Mahony et al., 2024). Regarding differences between urban and rural residents, previous surveys in Ireland have recorded little or none regarding their basic understanding of climate change and how worried they are about it (Timmons and Lunn, 2022; Leiserowitz et al., 2022). Rural and urban residents do not differ significantly in meat consumption, nor in their understanding of how everyday behaviours are linked to emissions (Timmons, Andersson, Lee and Lunn, 2024).

There is far less evidence specific to farmers. A 2014 survey of farmers in Ireland recorded uncertainty about GHG emissions and unwillingness to change practices to reduce it (Tzemi and Breen, 2019), but this may well have changed since. More recently, Läpple (2023) reports results from an opinion survey of a non-representative sample of livestock farmers in Ireland. The majority expressed concern about climate change and recognised that their own practices could contribute to mitigating it. However, almost half believed that reducing emissions on their farm would reduce profits. The study did not include a comparison group of non-farmers.

These findings helped to motivate the current investigation. We deployed a much greater range of survey questions about climate change than has been used previously, allowing us to explore the rural-urban comparison in greater depth and detail. Importantly, we compare farmers and non-farmers directly, using the same survey questions.

CHAPTER 2

Methods

The study uses an original survey of Irish farmers and the Irish rural and urban public to examine perceptions about climate change and climate policy. This section describes the study participants and survey procedures, the survey questionnaire, and the analysis methods.

2.1 PARTICIPANT SAMPLES

The total study sample consists of 1,667 Irish adults. This includes 467 farmers and 1,200 members of the general public, with the latter group evenly split between rural and urban participants.

The general public sample was recruited online via a market research agency (Red C) using quotas on gender, age group, and occupational status to ensure an approximately nationally representative sample. We did not use region quotas in this study, in order to achieve an even split of rural and urban participants (see Section 2.4.5 for details of the rural/urban measure). The final public sample oversamples from Munster and Connacht-Ulster.

The farmer sample was recruited via multiple channels to increase diversity and representativeness, particularly with respect to geographic location and farm type. All farmers in the sample confirmed that they met the eligibility criteria of working as a farmer in Ireland (including as an occasional or part-time farmer) through initial screening questions. However, unlike the general public who all completed the survey online, some farmers completed a pen-and-paper version of the survey while others completed the survey online.

198 farmers were recruited face to face by researchers while attending 9 farming events across Ireland. The events were chosen to provide geographical diversity (2 events in Connacht, 2 in Munster, 1 in Ulster, and 4 in Leinster) as well as diversity in participant backgrounds (1 sheep mart, 1 cattle mart, 1 weanlings – young cattle – mart, 4 agricultural shows, 1 national cattle farming training event, and 1 national dairy farming training event). Participants were given the option to complete the pen-and-paper version of the survey, or to participate online using the provided tablets or their own device (158 chose pen-and-paper and 40 chose online). Some participants also received assistance as needed in completing the survey (e.g. researcher reading questions out loud and recording answers).

35 farmers were recruited face to face by a market research agency (Ipsos) using an existing farmer panel, with agents visiting farmers' homes and collecting pen-and-paper responses. This group was a 'booster' sample targeting farm types that were under-represented in the sample near the end of the data collection period (i.e. farms other than beef and dairy, which were less likely to be represented at the in-person events described above).

160 farmers were recruited online via market research agencies or platforms (Red C, Pureprofile, and Prolific). These participants were targeted using information already provided to the platform (e.g. that they live on a farm, or that they work in agriculture), combined with screening questions.

74 farmers were recruited online via university agricultural departments as well as local agricultural colleges, using student mailing lists with the help of course coordinators or professors. These participants were farmers enrolled in agricultural training who met the eligibility criteria.

2.2 PARTICIPANT CHARACTERISTICS

Table 2.1 shows the unweighted socio-demographic characteristics of the public and farmer samples (see Table A.1 in the Online Appendix[6] for socio-demographic characteristics split by farmer sub-sample).

Gender is approximately nationally representative in the public sample. Men make up over two-thirds of the farmer sample. This is in line with the Census of Agriculture, which found that 27% of the agricultural labour force are women (Central Statistics Office, 2020).

Age is approximately nationally representative in the public sample, while in the farmer sample the largest group is 18–24-year-olds. This is due to recruiting 74 participants from agricultural college courses.[7] Farmers aged 55 and older make up almost one-third (30.5%) of the farmer sample. The Census of Agriculture does not report age figures for all farmers, but it does report that the largest age group among farm holders is those aged 65 and over (Central Statistics Office, 2020), although farm holders are likely to be older than farm employees.

Education is equivalent across the public and farmer samples: 37% of both groups have a university degree. For comparison, the National Farm Survey Sustainability Report (Teagasc, 2022) found that 56% of farm holders had some agricultural training, but this only includes farm holders and does not specify the qualification level.

Most farmers in our sample (87.7%) report living in a rural location.[8] By design, the public sample is split equally between urban and rural dwellers. The smallest share of the farming sample live in Dublin (11%), which is in line with the Census of Agriculture's finding that Dublin has the lowest share of farms in the country

[6] The Online Appendix contains all supplementary figures and tables and is available on the Open Science Framework at https://osf.io/qzg8b.

[7] All analysis models control for age, and we also replicated all main models without the youngest age group (18–24) to ensure that results are consistent when this group is excluded (see Online Appendix; also discussed in results section).

[8] Farmers living in an urban area may include agricultural students temporarily living away from home, farmers living in a town but commuting to a farm, or part-time farmers with other careers.

(Central Statistics Office, 2020). Both the public and the farmer samples are diverse across regions.

TABLE 2.1 SAMPLE SOCIO-DEMOGRAPHICS

	Public	Farmers
N	1,200 (71.99%)	467 (28.01%)
Gender		
Male	531 (44.3%)	314 (68.0%)
Female or non-binary	668 (55.7%)	148 (32.0%)
Age (see table notes)		
18–24	54 (4.5%)	115 (24.7%)
25–34	224 (18.7%)	82 (17.6%)
35–44	317 (26.4%)	65 (14.0%)
45–54	244 (20.3%)	61 (13.1%)
55–64	193 (16.1%)	80 (17.2%)
65 or older	168 (14.0%)	62 (13.3%)
University degree		
No	761 (63.4%)	291 (62.6%)
Yes	439 (36.6%)	174 (37.4%)
Social grade		
ABC1	607 (50.6%)	-
C2DE	593 (49.4%)	-
Farmer	-	467 (100.0%)
Rural or urban		
Urban	607 (50.6%)	57 (12.3%)
Rural	593 (49.4%)	407 (87.7%)
Region		
Dublin	229 (19.1%)	51 (11.0%)
Rest of Leinster	313 (26.1%)	172 (37.0%)
Munster	380 (31.7%)	106 (22.8%)
Connacht or Ulster	278 (23.2%)	136 (29.2%)

Source: Authors' analysis.
Note: The figures are not weighted. 73 of the 115 farmers aged 18–24 are from the agricultural students subsample. All analysis models control for age, and we also replicated all main models without the youngest age group (18–24) to ensure that results are consistent when this group is excluded (see Online Appendix; also discussed in results section). There are three non-binary participants. ABC1 refers to higher, intermediate, or junior managerial, professional, and administrative occupation. C2DE refers to skilled, semi-skilled, or unskilled manual workers, casual workers, unemployed participants, and full-time carers.

We also collected further socio-demographic characteristics from the farmer sample, including farm type and size, years of experience, farm holder status, and occupational status. Table 2.2 summarises unweighted characteristics, though all descriptive results are weighted to improve representativeness.

Farm type refers to the farm's primary output. In line with the Census of Agriculture (Central Statistics Office, 2020), most farmers in our sample are beef farmers (41% in sample and 55% in Census), sheep farmers (12% in sample and 13% in Census), or dairy farmers (24% in sample and 11% in Census). Dairy farmers are

over-represented in our sample, compared to national statistics. Crops farmers (combining tillage and mixed field crops) represent 7% of our sample and are under-represented (12% in Census). Mixed grazing livestock farmers (with or without crops) represent 6% of our sample (8% in Census). 'Other' farmers combine the smallest categories (horticulture or fruit, pig, poultry, equine, or 'other' where no detail was provided) and represent 10% of our sample (1% in Census; the discrepancy is partly due to the Census not covering some types of farms, such as equine).[9]

The largest farm sizes are over-represented in our sample, with 17% of the sample's farmers working on farms over 100 hectares in size (4% in Census of Agriculture, Central Statistics Office, 2020), while the smallest farm sizes (under 20 hectares) are under-represented (11% in sample and 44% in Census).

Farm holders represent almost half of the farmers in our sample (46%), with the next most frequent category being the spouse or relative of the farm holder, and a smaller share of farmers working on someone else's (not a relative's) farm. This is representative of national figures, as the Census of Agriculture reported that 47% of farmers are farm holders (Central Statistics Office, 2020).

Regarding years of experience, most farmers in our sample (66%) have been farming for over ten years. To our knowledge, there are no national statistics available on this measure, but the figure is consistent with Census figures showing that many farmers are older and farm holders (Central Statistics Office, 2020).

Finally, farming is a part-time occupation for 43% of the sample, while 36% of participants farm as their sole occupation. To our knowledge, there are no national statistics available on this measure. The Census of Agriculture reported that among farm holders (who represent 47% of farmers in the country and 46% of farmers in our sample), 53% farm as their sole occupation while 26% farm part-time, but farm holders are likely to be farming as their sole occupation in greater proportions than non-farm holders.

[9] We reallocated 41 pen-and-paper farmers who mistakenly selected more than one primary output to the largest (most frequent) farm type in Ireland among the ones they selected (35 to beef, 4 to sheep, 1 to dairy, 1 to other).

TABLE 2.2 FARMER CHARACTERISTICS

	Farmers
N	467
Farm type (primary)	
Beef (other than suckler cows)	70 (15.0%)
Beef (suckler cows)	123 (26.3%)
Sheep	55 (11.8%)
Dairy	111 (23.8%)
Crops	32 (6.9%)
Mixed livestock	30 (6.4%)
Other	46 (9.9%)
Farm size	
Less than 20 hectares	53 (11.3%)
20–30 hectares	78 (16.7%)
30–50 hectares	122 (26.1%)
50–100 hectares	137 (29.3%)
More than 100 hectares	77 (16.5%)
Years of experience farming	
0–5 years	93 (20.0%)
6–10 years	65 (14.0%)
More than 10 years	307 (66.0%)
Farm holder status	
Participant is the farm holder	214 (46.0%)
Spouse or relative is the farm holder	200 (43.0%)
Someone else (not a relative) is the farm holder	51 (11.0%)
Farming occupational status	
Sole occupation	166 (35.7%)
Main occupation	99 (21.3%)
Part-time or occasional occupation	200 (43.0%)

Source: Authors' analysis.
Note: The figures are not weighted. The 'Other' category in farm type includes horticulture, fruit, pig, poultry, equine, and other (but not specified) farmers.

2.3 PROCEDURE

Surveys were completed between May and August 2024, both online and in person, as described in Section 2.1. All 1,200 participants from the general public and 274 farmers completed the survey online, while a further 193 farmers completed a pen-and-paper version of the survey.

To avoid sample selection bias, participants were not told that the survey was about climate change and climate policy before they started the survey. Instead, the survey was called the 'Future of Farming in Ireland' survey and it was described in more general terms as being about issues impacting farmers.

Mean completion time for the online survey was 13 minutes (with a median of 8 minutes). The attrition rate was 7% (share of participants who passed the initial screening questions but did not finish the survey). There was no specific pattern as

to the stage of the survey where these individuals dropped out. During face-to-face recruitment at events, the rejection rate was high, as most farmers who we approached about the survey declined to participate, but attrition was very low among those who did agree to participate (exact attrition numbers were not recorded but each field researcher only observed a few instances of attrition).

We used several randomisations in the survey to avoid order bias from the order of questions and lists of items within questions, and to reduce participant burden by showing each participant 6 (out of 12) policies in the relevant section of the survey. Randomisation in the online survey was programmed systematically. For pen-and-paper surveys, we created four versions of the survey with different questions and item orders as well as policy subsets, and we manually shuffled surveys before handing them out.

Participants recruited via market research agencies or platforms (Red C, Pureprofile, Prolific, and Ipsos) were paid a small fee to compensate them for their time (approximately €2). All participants (farmers and the public) had the option to enter raffles[10] for a €200 digital Mastercard, as a way to incentivise answers to the knowledge questions (see Section 2.4.1). The raffle was communicated during face-to-face recruitment at farming events to encourage participation.

2.4 SURVEY QUESTIONNAIRE

The full survey is available on the Open Science Framework.[11]

Participants were first shown eligibility questions (farmers only), then the participant information sheet and consent form. They were then asked socio-demographic questions (Section 2.4.5) and questions about the top issues facing farmers (Section 2.4.2), current farming practices (farmers only), willingness to take action to help reduce climate change (Section 2.4.3), and climate change concern (Section 2.4.2). Next, they were asked incentivised questions about their knowledge of climate change (Section 2.4.1). Finally, they were asked about their perceptions of climate policies (Section 2.4.4).

The survey differed for the public samples and farmer sample in a few ways. First, farmers were asked eligibility questions. Second, they were asked about further socio-demographic characteristics (farm type and size, years farming, farm holder status, occupational status; see Table 2.2 and Section 2.4.5). Third, they were asked about their current farming practices, their awareness of specific farming practices that help reduce climate change, and their willingness to change the way they farm to help reduce climate change (see Section 2.4.3). Finally, the wording of questions about other people's climate change concern and willingness to take action was

[10] There was one raffle for participants recruited via Red C, one raffle for participants recruited via Pureprofile, and one raffle for all other participants. Participants were not told about other samples or other raffles.

[11] Available at https://osf.io/pk9bs.

changed where appropriate (e.g. from 'Irish farmers' to 'other Irish farmers', see Sections 2.4.2 and 2.4.3).

Accuracy in the knowledge section of the survey was incentivised: participants earned extra entries into the raffle for each correct answer (see Section 2.4.1).

2.4.1 Knowledge

Effects of climate change: We showed participants a list of six potential effects of climate change in random order, and asked them to identify which ones were real effects (adapted from Timmons and Lunn, 2022; and Teagasc, 2019). Correct items were 'Wetter winters with more storms, rainfall and floods', 'Drier summers with water shortages and heat stress in animals', 'More risk of new pests and diseases of plants and animals', and 'Warmer seas and rising sea levels'. Incorrect items were 'More volcanic eruptions and earthquakes' and 'Bigger hole in the ozone layer surrounding the Earth'. There was also a 'None of the above' option. Participants were told that they would receive one extra raffle ticket for each correct item, and one less raffle ticket for each incorrect item (to prevent them from selecting every answer as a strategy to maximise raffle entries). Participants' scores on this task spanned from 0 to 6 (one point for each item correctly selected or correctly left blank).

Sectors driving climate change: We asked participants to select the three sectors of the economy that contribute the most carbon emissions in Ireland, out of a list of six sectors shown in random order. The correct answers were 'Agriculture (for example, emissions from cattle)', 'Energy (for example, generating electricity)', and 'Transport (for example, emissions from cars)'. Incorrect answers included 'Waste (for example, gases from refrigeration and landfills)', 'Residential (for example, household heating)', and 'Industry, commercial, and public services (for example, manufacturing)' (emissions data from the Environmental Protection Agency, 2023; task adapted from Timmons and Lunn, 2022; O'Mahony et al., 2024). Participants were told that they would receive an extra raffle ticket for each correctly selected sector. They could only select three sectors. Scores spanned from 0 to 3 (one point for each correctly identified sector).

Effective climate actions: We showed participants five pairs of climate actions (the pairs were fixed, but we randomly varied their order). For each pair, we asked participants to select which action in the pair was the most effective to help reduce climate change (emissions data from Wynes and Nicholas, 2017; task adapted from O'Mahony et al., 2024; Timmons and Lunn, 2022). The pairs were as follows: 'Minimising food waste' (more effective) and 'Buying only local or organic food' (less effective); 'Avoiding one long-distance flight' (more effective) and 'Recycling as much as possible' (less effective); 'Washing clothes in cold water' (more effective) and 'Not littering' (less effective); 'Eating a plant-based diet (vegan)' (more effective) and 'Switching from a conventional car to a hybrid car' (less effective); and 'Hang drying clothes' (more effective) and 'Using reusable shopping bags' (less effective). Participants were told that they would receive an extra raffle

ticket for each correctly selected action. Scores spanned from 0 to 5 (number of pairs for which the participant selected the more effective action).

2.4.2 Concern

Top issues facing farmers: We asked participants which three issues, out of a list of eight, were the most important issues that farmers face in Ireland, in their opinion. The options, shown in random order, included: 'Changes to consumer preferences'; 'Climate change and its consequences'; 'Financial challenges (increased costs, low selling prices)'; 'Excessive regulations and compliance demands'; 'Negative perceptions about farming in society'; 'Finding someone to take over the farm'; 'High workload, feeling burnt out'; and 'Finding workers (labour shortage)' (partly based on AIB, 2023; BVA Xsight, 2024).

Worry about climate change: We asked participants how worried they were in general about climate change, on a seven-point numeric scale from '1 – Not at all worried' to '7 – Extremely worried'.

Others' worry: We asked participants how worried they thought 'farmers in Ireland' were about climate change (for the farmer sample, we asked about 'other farmers in Ireland'), and how worried they thought people in Ireland in general were about climate change. Both questions were rated on a seven-point numeric scale from '1 – Not at all worried' to '7 – Extremely worried'.

2.4.3 Willingness to change

We first asked questions about farming practices to the farmer sample only:

Current farming practices: We asked farmers how much they consider climate change when making decisions about the way that they farm. Farmers answered on a seven-point numeric scale from '1 – Not at all' to '7 – Very much'.

Awareness of green farming practices: We showed farmers a list of farming practices and asked them to indicate which practices they had heard of as a way to help reduce climate change. The practices were based on Teagasc educational materials (e.g. Teagasc, 2019) and shown in random order. They included: 'Switching to "protected urea" fertiliser'; 'Using soil tests'; 'Planting clover'; 'Using low-emission slurry spreading machines ("LESS" technologies)'; 'Spreading slurry early in the year'; 'Using energy-saving technologies like plate coolers, heat recovery systems, vacuum pumps, or solar panels'; 'Making biogas or biomethane from farm waste'; 'Improving animal genetics (fertility)'; 'Making the grazing season longer'; 'Reducing slaughter age'; 'Planting trees on farms, agroforestry'; 'Providing "amenity forestry", for example places for walking'; and 'Planting and protecting hedgerows'.

Willingness to change practices: We showed farmers the list of practices again and asked them, thinking about practices like these ones, how likely they would be to change the way they farm in the future to help reduce climate change, on a seven-point numeric scale from '1 – Very unlikely' to '7 – Very likely'.

We then asked the following questions to all participants (farmers and public):

Others' willingness to change practices: We asked participants how likely they thought Irish farmers were to change the way they farm in the future to help reduce climate change, on a seven-point numeric scale from '1 – Very unlikely' to '7 – Very likely' (farmers were asked about 'other Irish farmers', and the public was shown the list of green farming practices for context).

Willingness to change lifestyle: We showed participants a list of nine actions that help reduce climate change (e.g. flying less, eating less meat, going car-free, improving home energy efficiency…) and asked them, thinking about actions like these, how likely they were to make changes to their daily life in the future to help reduce climate change, on a seven-point numeric scale from '1 – Very unlikely' to '7 – Very likely'.

Others' willingness to change lifestyle: We asked participants how likely they thought other Irish people were to make changes to their daily life in the future to help reduce climate change, on a seven-point numeric scale from '1 – Very unlikely' to '7 – Very likely'.

2.4.4 Policy perceptions

We asked participants about their perceptions of climate policies. There were 12 policies in total: 4 about farming, 2 about flying, 2 about driving, 2 about energy, and 2 about industry. Half of the policies were 'restrictive' (taxes, mandates, bans, etc.), aiming to discourage actions that contribute to climate change, while the other half were 'non-restrictive' (subsidies, provision of public services, etc.), aiming to encourage actions that help reduce climate change.

Table 2.3 lists all 12 policies by sector and restrictiveness. To avoid excessive survey length, participants saw six policies each: half saw the policies marked (A), and half saw the policies marked (B) in the table. Policies were shown in random order.

The farming policies were selected to cover both restrictive and non-restrictive policies, including both current and hypothetical policies. Regarding non-restrictive policies, subsidies to help farmers transition to plant-based agriculture or forestry draw on the Afforestation Scheme and the (past) Tillage Incentive Scheme (DAFM, 2024a; 2024b), while assistance for farmers taking up energy-saving technologies draws on the Targeted Agricultural Modernisation Scheme (DAFM, 2024c). There are fewer examples of restrictive policies to draw on, as Ireland's policy approach has mainly sought to encourage voluntary action (as noted in Section 1). Therefore, we used policies that have been implemented abroad or that have recently been part of the public debate. For example, higher taxes on meat (with revenue earmarked to aid the climate transition of agriculture) have been agreed in Denmark (RTÉ, 2024) and discussed at the EU level (European Commission, 2023, p.9) and in Irish news (Hurson, 2023). Likewise, the topic of reducing the national herd size has been part of the public debate in recent years (e.g. RTÉ, 2023; McNally and Loughlin, 2024) and has been identified as likely to be one of the main paths to climate neutrality by the EPA (2024b).

Policy fairness, effectiveness, and support: We asked participants if they thought each policy would be effective at reducing climate change (on a seven-point numeric scale from '1 – No, not at all effective' to '7 – Yes, very effective'), if they thought the policy would be a fair way to try to reduce climate change (on a seven-point numeric scale from '1 – No, very unfair' to '7 – Yes, very fair'), and if they would support the policy as a way to try to reduce climate change (on a seven-point numeric scale from '1 – No, fully oppose' to '7 – Yes, fully support').

TABLE 2.3 CLIMATE POLICIES INCLUDED IN THE SURVEY

	Restrictive climate policies	Non-restrictive climate policies
Farming	Reducing the size of the national cattle herd (B) and Higher taxes on meat, with money collected used to support eco-friendly farming (A)	Subsidies to help farmers transition to plant-based agriculture or forestry (A) and Assistance programmes to help farmers take up energy-saving technologies (B)
Flying	Making flights more expensive to account for emissions (B)	Higher government spending on green air travel (such as electric flights and biofuel) (A)
Driving	Making city centres 'car-free zones' (A)	Increasing public transport routes and frequency to reduce car use (B)
Energy	Making renewable energy sources like wind or solar mandatory (A)	Increasing grants for retrofitting homes to be energy-efficient (B)
Industry	Stopping government subsidies for natural gas production (B)	Tax breaks for businesses that reduce their carbon emissions (A)

Source: Authors' analysis.
Note: Half of the participants saw the policies marked (A), and half saw the policies marked (B).

2.4.5 Socio-demographics and final questions

Overall socio-demographics: We asked all participants about their age, gender, country of birth, region, highest educational qualification, and (for the general public sample only) occupational group. Most of these measures are described in more detail in Table 2.1.

Farmer socio-demographics: We asked farmers about their farm type (primary output), farm size, years of experience farming, farm holder status (farm holder, spouse or relative is the farm holder, someone else is the farm holder), and occupational status (whether farming is their sole, main, or occasional or part-time occupation). These measures are described in more detail in Table 2.2.

Rural or urban status: We asked all participants whether they live in an urban or a rural area. Our measure was based on the Central Statistics Office's (2019) six-way classification, which takes into account place of work, distance to services and amenities, and population density. To adapt this classification to an anonymous survey, we asked participants to describe the area where they live, using six response items that map onto the six-way classification: 'A city', 'A town near a city that people may commute to for work' (satellite urban town), 'A town not near a

city' (independent urban town), 'A rural area near a town that people may commute to for work' (rural area with high urban influence), 'A rural area not near a town' (rural area with moderate urban influence), and 'A very rural and remote area' (highly rural and remote area).

Final questions:[12] We asked participants if they had difficulties answering the survey or if there was any reason we should not use their data. Participants who had not accessed the survey via a market research agency (i.e. those recruited at events or through agricultural courses) were also asked how they heard about the survey and for their contact details if they wanted to be included in the raffle.

2.5 ANALYSIS METHODS

The study was pre-registered on the Open Science Framework (pre-registration at https://osf.io/uwa4p).

2.5.1 Hypotheses and models

As the study is primarily a descriptive study that aims to measure and compare the perceptions of different groups, we pre-registered our research questions:[13]

- **Knowledge:** Are farmers more or less knowledgeable than the public about climate change?
- **Concern:** Are farmers more or less concerned than the public about climate change? How do farmers and the public perceive other people's concern?
- **Willingness to change:** Are farmers aware of and willing to adopt *farming practices* that help reduce climate change? How do farmers and the public perceive farmers' willingness to change? Are farmers and the public willing to adopt *lifestyle changes* that help reduce climate change? How do farmers and the public perceive other people's willingness to change?
- **Policy perceptions:** Do farmers and the public differ in their support for climate policies? Does knowledge or concern increase support? Do farmers and the public differ in their attitudes towards farming policies specifically?

[12] In addition to these questions, we also asked participants other questions that we do not analyse in this report. These include questions about farmers' social identity; farmers' perceptions of farmers as caretakers of the environment; and farmers and the public's perceptions of whether technological advances in different sectors will help stop climate change.

[13] There are some differences between the questions shown here and those in the pre-registration. First, questions on participants' perceptions of other people's concern and willingness have changed from whether perceptions are 'accurate' (which we will explore in a follow-up study separately) to whether perceptions differ between farmers and the public. Second, we changed a research question on policy perceptions from 'which policies do each group support' to whether groups differ in their support. In both cases, the changes are to help keep the analysis focused on comparing the perspectives of farmers and the public, but we also show descriptive statistics relating to the original questions. Third, we changed a question on whether knowledge and concern increase support for more restrictive policies to whether these factors increase support in general, controlling for restrictiveness (we also still report findings on the original analysis). This is discussed in more detail in Section 3.4.3.

- Are there differences between the rural and the urban public in the measures above? Are there differences between groups of farmers (e.g. by farm type)?

While we did not have hypotheses for most questions given their exploratory nature, we pre-registered hypotheses about narrower aspects of these questions where we expected specific patterns, including that farmers would be: more likely than the public to identify the weather effects of climate change; less likely than the public to identify agriculture as a main driver of climate change or to identify plant-based diets as an effective climate action; and less (more) likely than the public to support restrictive (non-restrictive) farming policies and to think that these policies are fair and effective.[14]

We pre-registered analysis models for each research question. For most research questions, the analysis aimed to test for differences between farmers and the public. To do so, the analysis used linear regressions of the outcome of interest (e.g. knowledge, concern, willingness to change, policy support) on a categorical group variable (farmer, urban public, or rural public) and socio-demographic controls (age, gender, region and education). We also included other covariates and interaction terms as needed to answer the research questions. Robustness checks included (ordered) logistic regressions as appropriate depending on the outcome variable.[15]

In some instances, the analysis used multi-level models with several observations per person. This was applicable to models testing overall policy perceptions, and to models testing participants' answers to the plant-based diet item compared to other items in the knowledge task on effective climate actions. In these instances, we clustered standard errors and added random intercepts[16] by person and also added fixed effects as appropriate (e.g. policy restrictiveness).

Finally, the analysis deviated from the pre-registration in several instances, for example where descriptive statistics suggested alternative analyses may be more suited to answer the research questions. This is highlighted throughout the report where applicable using footnotes. Exploratory analyses are highlighted in the main text.

[14] We also pre-registered additional research questions and hypotheses, which we do not cover here and will report in a future study. These focus on different groups' underestimation of other people's climate change concern and willingness to take climate action, and on the role of farmers' identity and beliefs about technological solutions to climate change.

[15] In the pre-registration, we planned to use Poisson models as robustness checks for the climate change knowledge models (where the outcome variable is a score); however, upon further investigation this would not be appropriate as knowledge scores are not 'count' data and therefore we did not conduct these robustness checks and used linear regressions instead.

[16] This was not specified in the pre-registration but allows the models to account for intra-person correlation.

2.5.2 Ensuring generalisable results

The sampling strategy aimed to recruit a diverse and unbiased sample of farmers, using multiple participant sources and channels and presenting the survey as being about the future of farming (not climate change specifically). However, the demographics of the farmer sample suggest that it is not proportionally representative of national farmer statistics (see Section 2.2). To address this, we pre-registered several measures to ensure that the study results reflect the perceptions, understanding and views of the overall Irish farmer population.

First, all descriptive findings in the report use survey weights for farmers (i.e. all descriptive statistics and figures, except Tables 2.1 and 2.2). The weights are based on the Census of Agriculture (Central Statistics Office, 2020). Farmers were weighted on farm holder status, gender, farm size, and farm type. More details about the rationale for the weights included and the weighing process are provided on the Open Science Framework.[17] We also discuss in the same document the rationale for the categorisation of some farmer socio-demographics, such as bundling infrequent farm types together, as well as decisions made on how to handle missing data, inattention, or participant errors.[18]

In addition, we used several robustness checks to test the (unweighted) analysis models. This included testing that the results are robust to excluding the youngest age group (given the over-representation of young farmers as a result of recruiting from agricultural courses) and excluding, in turn, farmers who either completed the survey online or on paper (to confirm that sample selection bias does not drive results). It also included pre-registered secondary models that compared the overall public to different groups of farmers (by farm type, farm size, years of experience, farm holder status, and farmer occupation) to test whether specific groups of farmers are driving the results on farmer-public differences or show a different pattern compared to other groups. We discuss the findings of the secondary models (and other robustness checks) throughout the results section.

[17] Available at https://osf.io/ympfr.

[18] Since it was possible to select more or fewer answers than instructed in the pen-and-paper survey, 36 farmers provided too few or too many answers in at least one instance (e.g. when asked to choose the three sectors most contributing to climate change). We included participants who chose too few but not too many answers in analysis models as relevant, and we confirmed in robustness checks that excluding participants who made mistakes from the study altogether (or for whom we had missing data in at least one question) does not significantly alter results.

CHAPTER 3

Results

In this section we report findings on the perceptions of Irish farmers and of the rural and urban Irish public about farming, climate change, and climate policy. The following chapter (Chapter 4 – Discussion) also provides a summary of the results.

3.1 KNOWLEDGE

3.1.1 Effects of climate change

We asked participants whether six items from a list (e.g. wetter winters) were real effects of climate change or not. On average, participants scored 4.03 out of a maximum possible score of 6 (SD=1.15). Figure 3.1 shows average scores for farmers and for the rural and urban public. All groups scored between 3.9 and 4.2, which is higher than if they had chosen at random (a 'chance' score would be 3 out of 6). The distribution of these scores is in Figure A.1 (Online Appendix).

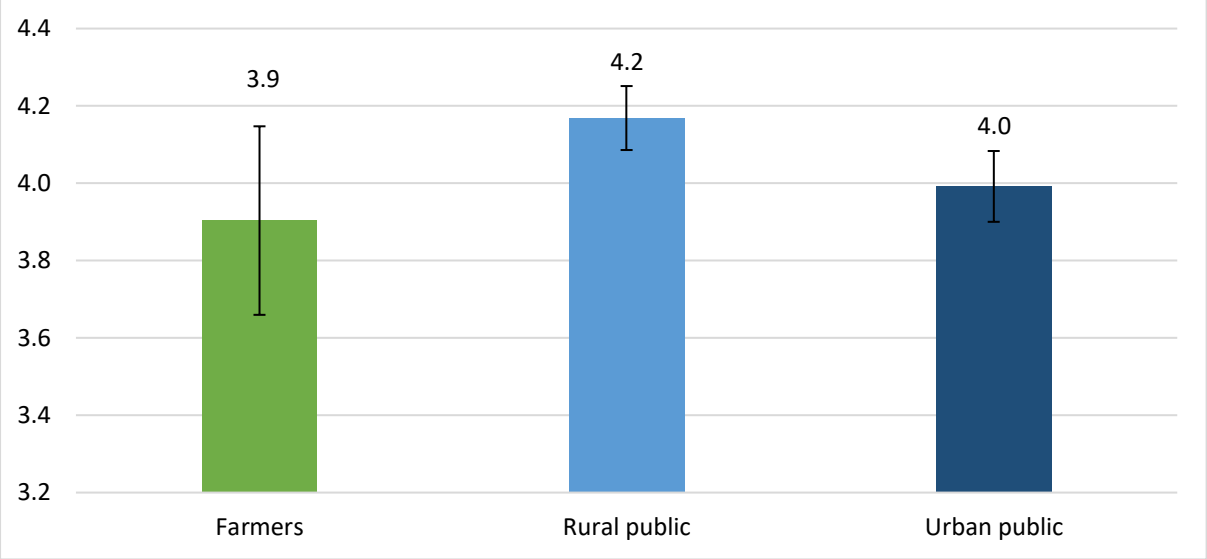
Table 3.1 shows the results of a linear regression model comparing farmers and the public's scores, with socio-demographic controls. We found no significant difference between farmers and the urban public, and a small significant difference between farmers and the rural public, equivalent to 0.15 SD in size. When we used the rural public as an alternative base level in the model, we found an even smaller significant difference between the rural and urban public, equivalent to 0.12 SD (b=-0.14, p=0.04).[19,20]

We found consistent results in further models focusing specifically on weather-related items (Table A.2 in Online Appendix), models excluding the youngest age group (Table A.3), and models excluding the in-person or online farmer sample (Table A.4). We also compared the overall public to different groups of farmers, focusing on farm type and size, years of experience, farm holder status, and occupational status (Tables A.5–A.9), and we found no significant differences, except for farmers with 0–5 years of experience (effect size of 0.25 SD) and farms of 20–30 hectares in size (effect size of 0.30 SD).

[19] When comparing the public living in Dublin with the public living outside of Dublin (and removing the control for region) as an exploratory analysis, we found no significant difference between these two groups.

[20] In the pre-registration, we planned to use Wald tests for all comparisons of the rural and urban public, but for simplicity we changed this approach throughout to simply changing the base level of the group variable in our analysis models (from farmer to rural public), which directly provides a coefficient and p-value for the rural-urban public difference.

FIGURE 3.1 KNOWLEDGE ABOUT EFFECTS OF CLIMATE CHANGE



Source: Authors' analysis.
Notes: The figure uses survey weights and is re-scaled to 1 standard deviation. Error bars are 95% confidence intervals.

TABLE 3.1 GROUP DIFFERENCES IN KNOWLEDGE ABOUT EFFECTS OF CLIMATE CHANGE

	Effects knowledge (scored 0–6)		
	Coef.	**SE**	**p-value**
Group *(base: farmer)*			
Rural public	0.17	(0.07)	0.02
Urban public	0.02	(0.07)	0.74
Age *(base: 45–54)*			
18–24	-0.05	(0.11)	0.68
25–34	-0.37	(0.09)	0.00
35–44	-0.14	(0.08)	0.09
55–64	-0.03	(0.09)	0.74
65 or older	-0.08	(0.10)	0.41
Female	-0.21	(0.06)	0.00
University degree	0.44	(0.06)	0.00
Region *(base: Dublin)*			
Rest of Leinster	0.00	(0.09)	0.96
Munster	0.02	(0.09)	0.78
Connacht or Ulster	0.05	(0.09)	0.62
Constant	4.05	(0.11)	0.00
Observations	1654		

Source: Authors' analysis.

3.1.2 Sectors driving climate change

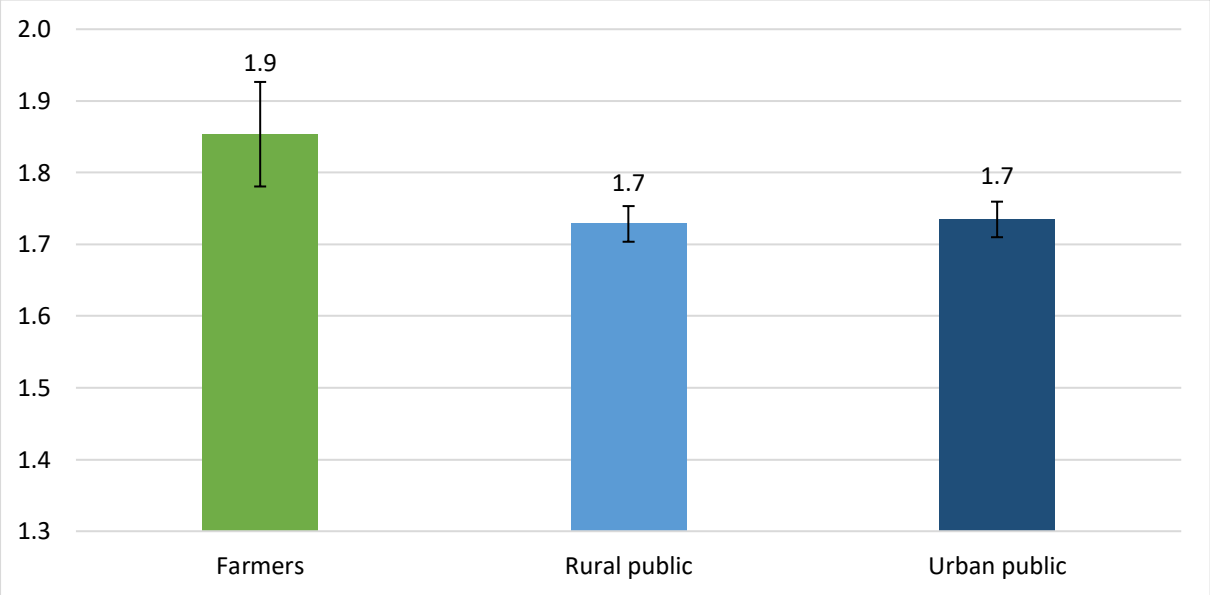
We asked participants to identify the three sectors of the Irish economy that create the most carbon emissions, out of a list of six sectors (e.g. transport). On average, participants scored 1.76 out of a possible score of 3 (SD=0.64). Figure 3.2 shows

average scores for farmers and for the rural and urban public. All groups scored between 1.7 and 1.9, so higher than if they had chosen at random ('chance' score is 1.5). The distribution of participants' scores is available in Figure A.2 (in Online Appendix).

Table 3.2 shows the results of a linear regression model comparing farmers and the public's scores, with socio-demographic controls. We found no significant difference between farmers and the urban public, or between farmers and the rural public. We also found no significant difference between the urban and rural public when we used the rural public as the base level in the model (b=0.01, p=0.82).[21]

We found consistent results in models excluding the youngest age group (Table A.10 in Online Appendix) and excluding the in-person sample, though when we excluded the online sample we found small significant differences between farmers and the urban and rural public, both equivalent to 0.22 SD (Table A.11). We also compared the overall public to different groups of farmers, focusing on farm type and size, years of experience, farm holder status, and occupational status (Tables A.12–A.16). We found no significant differences, except for dairy farmers (scored higher, effect size of 0.22 SD) and farmers for whom farming is their main (but not sole) occupation (scored higher, effect size of 0.23 SD).

FIGURE 3.2 KNOWLEDGE ABOUT SECTORS DRIVING CLIMATE CHANGE



Source: Authors' analysis.
Notes: The figure uses survey weights and is re-scaled to 1 standard deviation. Error bars are 95% confidence intervals.

[21] When comparing the public living in Dublin with the public living outside of Dublin (and removing the control for region) as an exploratory analysis, we also found no significant difference between these two groups.

TABLE 3.2 GROUP DIFFERENCES IN KNOWLEDGE ABOUT SECTORS DRIVING CLIMATE CHANGE

	Sectors knowledge (scored 0–3)		
	Coef.	**SE**	**p-value**
Group *(base: farmer)*			
Rural public	-0.06	(0.04)	0.17
Urban public	-0.05	(0.04)	0.25
Age *(base: 45–54)*			
18–24	0.16	(0.06)	0.01
25–34	-0.05	(0.05)	0.33
35–44	0.02	(0.05)	0.73
55–64	-0.00	(0.05)	0.93
65 or older	-0.03	(0.06)	0.62
Female	-0.16	(0.03)	0.00
University degree	0.08	(0.03)	0.03
Region *(base: Dublin)*			
Rest of Leinster	0.06	(0.05)	0.25
Munster	0.10	(0.05)	0.04
Connacht or Ulster	0.02	(0.05)	0.67
Constant	1.80	(0.06)	0.00
Observations	1635		

Source: Authors' analysis.
Note: The model excludes 24 farmers who mistakenly picked more or less than three sectors (note: five of these farmers are already excluded from analysis models due to missing gender, education, or region, hence the discrepancy with the previous table).

We also examined participants' ability to specifically identify agriculture as one of the three sectors that most contribute to Ireland's emissions. Overall, 62% of participants identified agriculture, which is higher than a 'chance' outcome of 50%. Figure 3.3 shows the proportion of farmers and of the rural and urban public who identified agriculture. These proportions span from 61% to 64% across groups: more than one in three participants in each group did not identify agriculture.

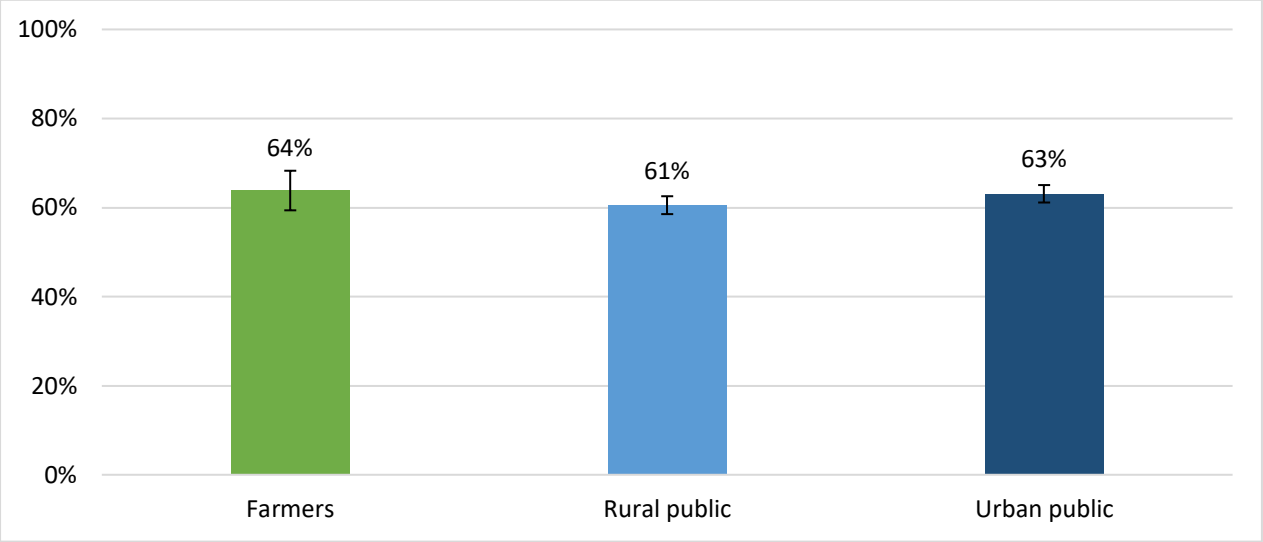
Table 3.3 shows the results of a linear probability model with socio-demographic controls testing for differences in groups' identification of agriculture. We found no significant differences between farmers and the urban public, or between farmers and the rural public. We also found no significant difference between the urban and rural public when we used the rural public as the base level (b=0.01, p=0.67).[22]

We found consistent results when using a binary logistic regression model (Table A.17 in Online Appendix), excluding the youngest age group (Table A.18), and excluding the online or in-person farmer sample (Table A.19). We also compared the overall public to different groups of farmers, focusing on farm type

[22] When comparing the public living in Dublin with the public living outside of Dublin (and removing the control for region) as an exploratory analysis, we also found no significant difference between these two groups.

and size, farmers' years of experience, farm holder status, and farmer occupation (Tables A.20–A.24), and we found no significant differences, except that sole occupation farmers were significantly more likely (effect size of 0.23 SD) and main occupation farmers significantly less likely (effect size also 0.23 SD in opposite direction) than the public to identify agriculture (no significant difference for part-time farmers).

FIGURE 3.3 PARTICIPANTS WHO IDENTIFIED AGRICULTURE AS A HIGH-EMISSIONS SECTOR



Source: Authors' analysis.
Notes: The figure uses survey weights. Error bars are 95% confidence intervals.

TABLE 3.3 GROUP DIFFERENCES IN IDENTIFYING AGRICULTURE AS A HIGH-EMISSIONS SECTOR

	Identified agriculture? (0–1)		
	Coef.	**SE**	**p-value**
Group *(base: farmer)*			
Rural public	0.03	(0.03)	0.39
Urban public	0.04	(0.03)	0.21
Age *(base: 45–54)*			
18–24	0.16	(0.05)	0.00
25–34	0.06	(0.04)	0.12
35–44	-0.02	(0.04)	0.62
55–64	-0.02	(0.04)	0.68
65 or older	0.01	(0.04)	0.85
Female	-0.04	(0.02)	0.09
University degree	0.05	(0.03)	0.07
Region *(base: Dublin)*			
Rest of Leinster	0.00	(0.04)	0.92
Munster	0.05	(0.04)	0.22
Connacht or Ulster	0.02	(0.04)	0.67
Constant	0.56	(0.05)	0.00
Observations	1653		

Source: Authors' analysis.
Note: The model excludes one farmer who mistakenly picked more than three sectors.

3.1.3 Effective climate actions

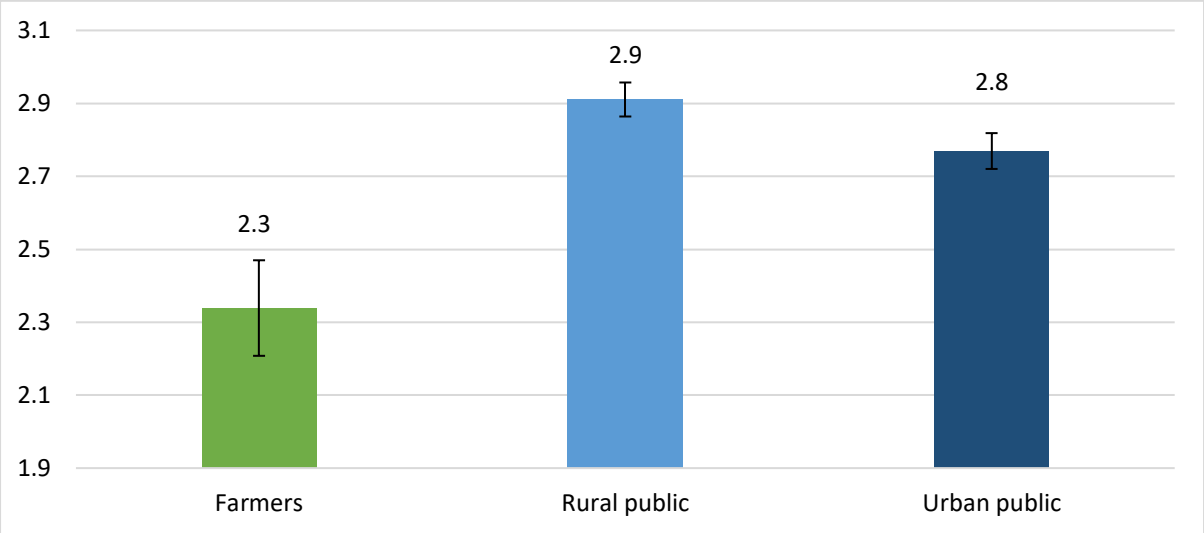
We showed participants five successive pairs of climate actions and asked them to choose the most effective action in each pair (e.g. one pair was 'recycling' vs. 'flying less') in order to test their ability to recognise high-impact climate actions. On average, participants correctly identified the most effective action in 2.70 of the 5 pairs (SD=1.25). Figure 3.4 shows average scores for farmers and the rural and urban public. Farmers scored 2.3 on average (lower than the 'chance' score of 2.5), while the rural and urban public scored 2.9 and 2.8 respectively on average (higher than the 'chance' score). The distribution of participants' scores is available in Figure A.3 (in Online Appendix; see also Figure 3.5 for the proportion of participants who chose the correct action in each pair).

Table 3.4 shows the results of a linear regression model comparing farmers and the public's scores, with socio-demographic controls. We found that farmers score lower than both the rural public and the urban public (effect sizes equivalent to 0.46 and 0.34 SD, respectively). This gap cannot be explained by age or education levels, as both are included as controls in the model (note also that the farmer and public samples have similar education levels, see Table 2.1). We found no significant difference between the urban and rural public when we used the rural

public as the base level in the model (b=-0.14, p=0.06).[23]

We found consistent results in models excluding the youngest age group (Table A.25 in Online Appendix); excluding the online or in-person farmer sample (Table A.26); comparing different groups of farmers to the overall public, focusing on farm type and size, farmers' experience, farm holder status, and farmer occupation (Tables A.27–A.31); excluding the plant-based diet question (i.e. the most relevant item to the agricultural sector) (Table A.32); and focusing only on the plant-based diet question (Table A.33).

FIGURE 3.4 KNOWLEDGE ABOUT EFFECTIVE CLIMATE ACTIONS



Source: Authors' analysis.
Notes: The figure uses survey weights and is re-scaled to 1 standard deviation. Error bars are 95% confidence intervals.

[23] When comparing the public living in Dublin with the public living outside of Dublin (and removing the control for region) as an exploratory analysis, we also found no significant difference between these two groups.

TABLE 3.4 GROUP DIFFERENCES IN KNOWLEDGE ABOUT EFFECTIVE CLIMATE ACTIONS

	Actions knowledge (scored 0–5)		
	Coef.	**SE**	**p-value**
Group *(base: farmer)*			
Rural public	0.57	(0.08)	0.00
Urban public	0.43	(0.08)	0.00
Age *(base: 45–54)*			
18–24	-0.41	(0.12)	0.00
25–34	-0.25	(0.10)	0.01
35–44	-0.09	(0.09)	0.33
55–64	-0.04	(0.10)	0.66
65 or older	-0.06	(0.10)	0.56
Female	-0.04	(0.06)	0.54
University degree	0.30	(0.06)	0.00
Region *(base: Dublin)*			
Rest of Leinster	-0.02	(0.10)	0.86
Munster	-0.07	(0.09)	0.45
Connacht or Ulster	-0.14	(0.10)	0.16
Constant	2.41	(0.12)	0.00
Observations	1651		

Source: Authors' analysis.
Note: The model excludes nine farmers who made a mistake (i.e. chose both/no action in at least one pair). Some of these farmers were already being excluded due to missing gender, region, or education hence the discrepancy with previous models is lower than nine.

As an exploratory (not pre-registered) analysis, we further examined participants' answers to the question most relevant to farmers: 'eating a plant-based diet' vs. 'switching from a conventional car to a hybrid car' (plant-based diet is more effective). Overall, 34% of participants answered this question correctly. Figure 3.5 shows the share of participants who answered each question correctly. It shows that 20% of farmers, 37% of the rural public, and 40% of the urban public answered the plant-based question correctly. This is lower than if they had chosen at random (50%), and this question was also the one that participants were most likely to get wrong.

Table 3.5 shows the results of a linear probability model with socio-demographic controls testing whether the difference between farmers and the public (identified in Table 3.4) varies between the plant-based question and others. To do so, we pooled all questions (i.e. five observations per participant) and used an interaction term between group (farmers, rural, or urban public) and question (binary dummy for plant-based question vs. one of the other four). We clustered standard errors and included random intercepts by person. We found that the difference between farmers and the public is significantly larger for the plant-based question than for other questions. A possible interpretation of this result is that there is motivated reasoning among the farmer sample, given the relevance of the climate impact of diets to the farming sector.

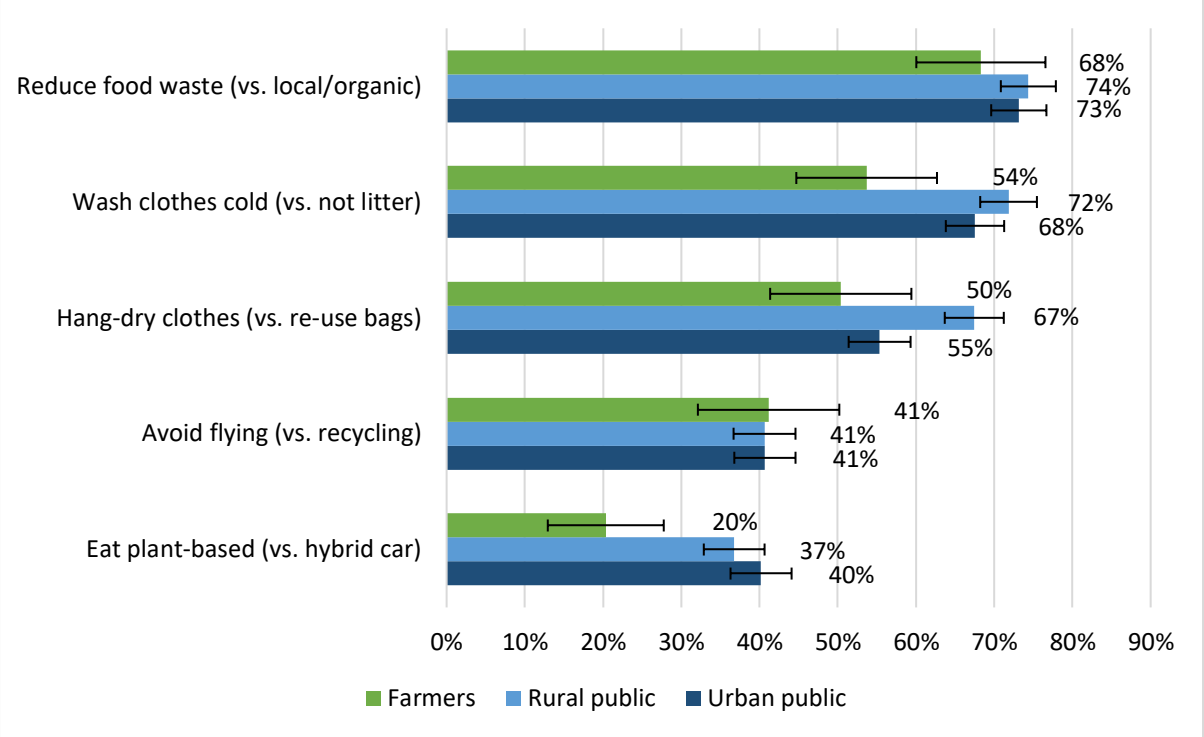
This result is robust to using a logistic regression model (Table A.34 in Online Appendix), excluding the youngest age group (Table A.35), and excluding the online or in-person farmer sample (Table A.36), except that in the online sample, the size of the difference between farmers and the rural public does not significantly vary between the plant-based question and other questions.

Finally, we examined how the size of the difference between farmers and the public varies between the plant-based question and other questions based on different farmer characteristics, including farm type and size, farmer experience, farm holder status, and occupation (Tables A.37–A.41 in Online Appendix).

We found that the increase in the difference between farmers and the public for the plant-based question (compared to other questions) was significantly larger for beef and dairy farmers, while for crops farmers this effect disappeared. The effect also increased in size and significance with farm size, with farms over 100 hectares showing the strongest effect. It also increased with years of experience farming, with those between 0–5 years of experience showing no effect, but the effect appearing and increasing in size and significance with more years of experience (age was also controlled for separately in the model). The effect was also present for farm holders and relatives of farm holders, but not for those working on someone else's farm (not a relative). However, there was an effect both for sole occupation farmers and for part-time farmers, but not for main occupation farmers (Tables A.37–A.41). These findings are broadly consistent with the motivated reasoning interpretation, whereby the groups of farmers most incentivised to downplay the climate benefits of plant-based diets would be more likely to demonstrate a bias against this response.

To summarise, we find that farmers are less knowledgeable than the public about effective climate actions, and this is not explained by education or age. This gap is largest for the 'plant-based diet' action, which may be explained by motivated reasoning, but it is still present in other actions unrelated to the farming sector. Therefore, farmers' overall lower knowledge about effective climate actions may be affected by motivated reasoning, but it cannot be solely explained by it.

FIGURE 3.5 PARTICIPANTS WHO IDENTIFIED EFFECTIVE CLIMATE ACTIONS (BY PAIR)



Source: Authors' analysis.
Notes: The figure uses survey weights. Error bars are 95% confidence intervals.

TABLE 3.5 INTERACTION BETWEEN GROUP AND PLANT-BASED (VS. OTHER) CLIMATE ACTIONS

	Answered question correctly? (0–1)		
	Coef.	**SE**	**p-value**
Plant-based Q *(base: other Q)*	-0.34	(0.02)	0.00
Group *(base: farmer)*			
Rural public	0.10	(0.02)	0.00
Urban public	0.06	(0.02)	0.00
Plant-based * Rural public	0.07	(0.03)	0.02
Plant-based * Urban public	0.15	(0.03)	0.00
Age *(base: 45–54)*			
18–24	-0.08	(0.03)	0.00
25–34	-0.05	(0.02)	0.02
35–44	-0.02	(0.02)	0.30
55–64	-0.01	(0.02)	0.66
65 or older	-0.01	(0.02)	0.58
Female	-0.01	(0.01)	0.52
University degree	0.06	(0.01)	0.00
Region *(base: Dublin)*			
Rest of Leinster	-0.00	(0.02)	0.85
Munster	-0.01	(0.02)	0.50
Connacht or Ulster	-0.03	(0.02)	0.19
Constant	0.55	(0.03)	0.00
Observations	8280		

Source: Authors' analysis.
Note: There are five observations per person (one per question). The model includes clustered standard errors and random intercepts by person. The model excludes nine farmers who made a mistake (i.e. chose both or no action in at least one pair).

3.2 CONCERN

3.2.1 Top issues facing farmers

We asked participants to select the three most important issues facing farmers, out of a list of eight issues. Overall, over half of the participants (55%) selected climate change as a top issue. Figure 3.6 shows that climate change was in fourth place for farmers in terms of how often they chose this answer as part of their top three, while for the rural and urban public it was in second place. Instead, farmers ranked issues such as excessive regulation and negative perceptions of farming higher than the public.

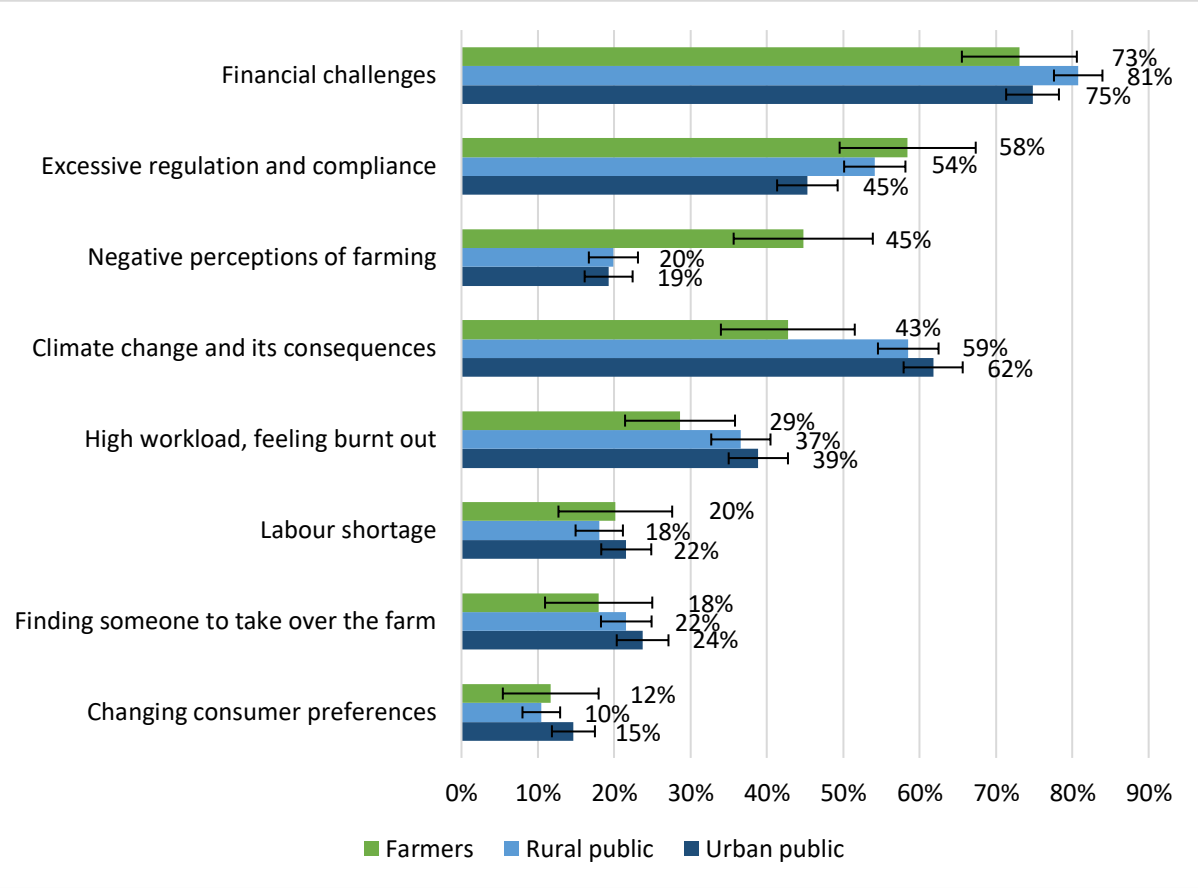
We tested whether farmers and the rural and urban public differed in their likelihood of selecting climate change as a top three issue, using a linear probability model with socio-demographic controls. Table 3.6 shows the results of this model. We found that both the rural and urban public were significantly more likely than farmers to select climate change as a top three issue facing farmers (effect sizes equivalent to 0.30 and 0.40 SD, respectively). We found no significant difference between the urban and rural public when we used the rural public as the base level

in the model (b=0.05, p=0.13).[24]

However, a substitution effect is likely responsible for at least part of the difference between farmers and the public: participants could only choose three issues, but farmers are likely aware of additional issues that the public may not have as much visibility over (such as keeping up with regulations or experiencing negative perceptions of farming).

We found consistent results in models using a logistic regression (Table A.42 in Online Appendix), excluding the youngest age group (Table A.43), excluding the online or in-person farmer sample (Table A.44), and comparing different groups of farmers to the overall public, focusing on farm type and size and farmers' experience, farm holder status, and occupation (Tables A.45–A.49), though effects for farmers working on someone else's farm (not a relative) and crops and sheep farmers were not significant.

FIGURE 3.6 PROPORTION OF PARTICIPANTS WHO SELECTED EACH ISSUE AS A TOP FARMER ISSUE



Source: Authors' analysis.
Notes: The figure uses survey weights. Error bars are 95% confidence intervals. Each participant could select three issues.

[24] When comparing the public living in Dublin with the public living outside of Dublin (and removing the control for region) as an exploratory analysis, we also found no significant difference between these two groups.

TABLE 3.6 GROUP DIFFERENCES IN SELECTING CLIMATE CHANGE AS A TOP FARMER ISSUE

	Identified climate change? (0–1)		
	Coef.	**SE**	**p-value**
Group *(base: farmer)*			
Rural public	0.15	(0.03)	0.00
Urban public	0.20	(0.03)	0.00
Age *(base: 45–54)*			
18–24	0.00	(0.05)	0.99
25–34	-0.00	(0.04)	0.99
35–44	0.00	(0.04)	0.92
55–64	0.02	(0.04)	0.66
65 or older	0.07	(0.04)	0.10
Female	0.07	(0.03)	0.01
University degree	-0.02	(0.03)	0.48
Region *(base: Dublin)*			
Rest of Leinster	0.04	(0.04)	0.30
Munster	-0.01	(0.04)	0.81
Connacht or Ulster	-0.01	(0.04)	0.84
Constant	0.37	(0.05)	0.00
Observations	1653		

Source: Authors' analysis.
Note: The model excludes six participants who mistakenly selected more than three top issues.

3.2.2 Worry about climate change

We asked participants how worried they were about climate change, on a numeric scale from 1 to 7. Overall, participants showed a relatively high level of worry, with an average of 4.66 (SD=1.72) across the sample. The average worry for farmers was 4.38 (SD=1.75), while for the rural public it was 4.70 (SD=1.67) and for the urban public it was 4.84 (SD=1.72).

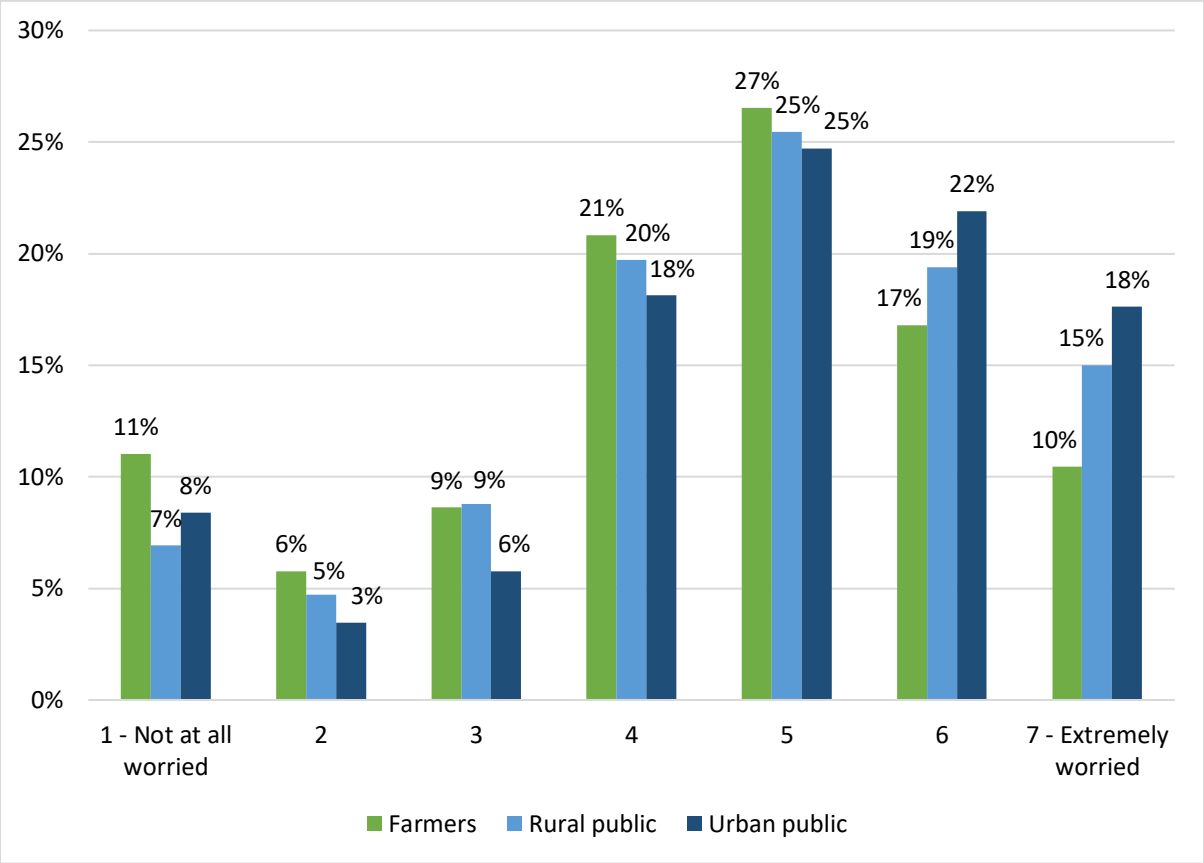
Figure 3.7 shows the distribution of worry for each group. There is a relatively consistent pattern in the distribution of all three groups' worry, with most participants showing a high level of concern (over half of the participants in all groups rate their worry as a 5 or above), but there is also some bimodality in the distributions, with a small group of 'not at all worried' participants (7–11%).

We used a linear regression model to test whether farmers differed from the rural and urban public in their level of worry over climate change. Table 3.7 shows the results of this model. We found no significant difference between farmers and the rural public, nor between farmers and the urban public. We also found no significant difference between the rural and urban public when using the rural

public as base level in the model (b=0.05, p=0.67).[25]

In further models, we also found no significant differences between farmers and the rural and urban public when using an ordered logistic regression model (Table A.50 in Online Appendix); excluding the youngest age group (Table A.51); excluding the online or in-person farmer sample (Table A.52); and comparing different groups of farmers to the overall public, focusing on farm type and size, farmer experience, farm holder status, and farmer occupation (Tables A.53–A.57).

FIGURE 3.7 DISTRIBUTION OF PARTICIPANTS' WORRY ABOUT CLIMATE CHANGE



Source: Authors' analysis.
Notes: The figure uses survey weights.

[25] When comparing the public living in Dublin with the public living outside of Dublin (and removing the control for region) as an exploratory analysis, we also found no significant difference between these two groups.

TABLE 3.7 GROUP DIFFERENCES IN WORRY ABOUT CLIMATE CHANGE

	How worried are you? (1–7)		
	Coef.	**SE**	**p-value**
Group *(base: farmer)*			
Rural public	-0.01	(0.11)	0.91
Urban public	0.03	(0.11)	0.78
Age *(base: 45–54)*			
18–24	0.38	(0.17)	0.02
25–34	0.36	(0.14)	0.01
35–44	0.01	(0.13)	0.94
55–64	0.30	(0.14)	0.03
65 or older	0.27	(0.15)	0.07
Female	0.35	(0.08)	0.00
University degree	0.24	(0.09)	0.01
Region *(base: Dublin)*			
Rest of Leinster	-0.20	(0.14)	0.15
Munster	-0.09	(0.13)	0.50
Connacht or Ulster	-0.34	(0.14)	0.02
Constant	4.46	(0.17)	0.00
Observations	1659		

Source: Authors' analysis.
Note: The model excludes six participants who mistakenly selected more than three top issues.

3.2.3 Perceptions about others' concern

We asked participants how worried they thought Irish farmers were about climate change, and how worried they thought Irish people in general were, on a seven-point numeric scale. On average, participants estimated Irish farmers' level of worry at 4.19 (SD=1.44), and Irish people's level of worry at 4.52 (SD=1.59).

Figure 3.8 shows each group's average ratings of their own worry (reported in Section 3.2.2); of Irish people's worry; and of Irish farmers' worry. All groups' ratings of Irish people's worry are within 0.1 point of each other, and their ratings of Irish farmers' worry are within 0.2 points of each other. The rural and urban public rated their own worry the highest, followed by other Irish people, then Irish farmers. Irish farmers rated other Irish people's worry the highest, then their own worry, and other farmers slightly lower, but these three averages are all within only 0.2 points of each other (compared to 0.6 points for the public).

Table 3.8 shows the results of exploratory (not pre-registered) linear regression models testing whether farmers and the public differ in their perceptions of Irish

farmers' (model A) and Irish people's (model B) worry.[26] In model A, we found a significant difference between farmers and both the rural and the urban public (effect sizes equivalent to 0.34 and 0.27 SD, respectively), with the public rating Irish farmers' worry lower than farmers do. In model B, we found no significant differences between farmers and the rural and urban public's ratings of Irish people's worry. We also found no significant differences between the rural and urban public when using the rural public as base level (model A: b=0.10, p=0.27; model B: b=0.02, p=0.88).[27]

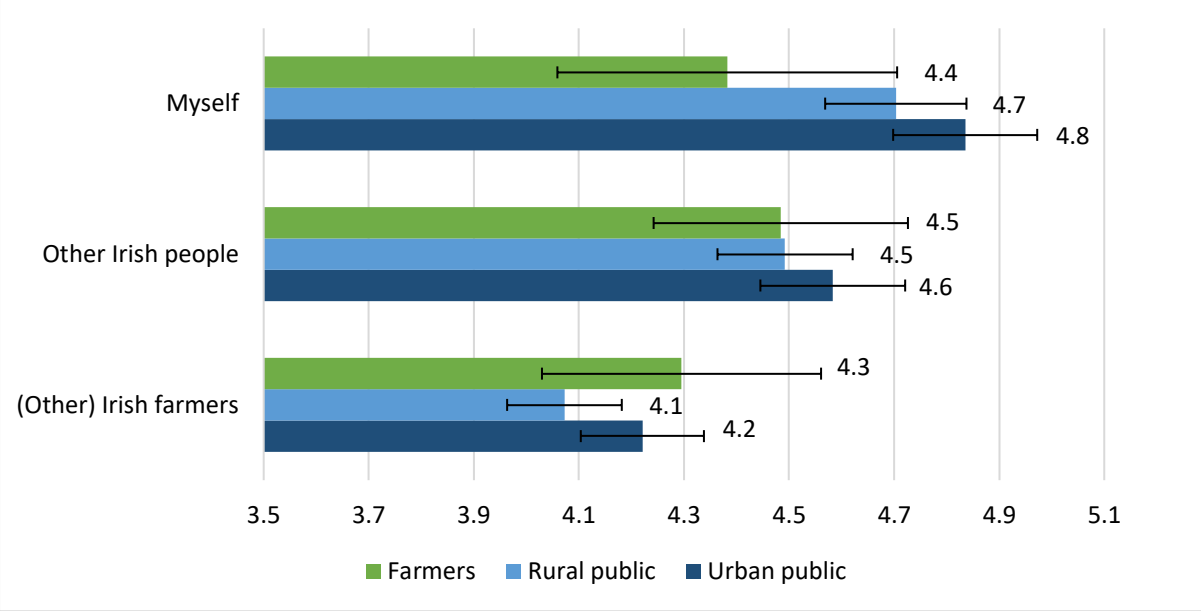
We found consistent results in models using ordered logistic regressions (Table A.58 in Online Appendix), excluding the youngest age group (Table A.59), and excluding the online or in-person farmer sample (Table A.60).

We also compared different groups of farmers to the overall public, focusing on farm type and size, farmer experience, farm holder status, and farmer occupation (Tables A.61–A.65 in Online Appendix). We found some deviations from the results in Table 3.8. For example, crops farmers rated Irish people as less worried than the public did (but this difference was not significant), and beef suckler and dairy farmers were the only ones whose rating of farmers' worry was significantly higher than the public's (this may simply reflect their higher statistical power as the two largest farm types). Farm holders rated Irish people as significantly more worried than the public did. Other categories (e.g. smallest and largest farms) did not significantly differ from the public in their ratings of farmers' worry, possibly due to low statistical power.

[26] As discussed in Section 2.5.1, the pre-registration planned for testing whether farmers and the public's perceptions of their peers and each other's worry are 'accurate' by comparing perceptions of each group to this group's actual (average own) worry using t-tests. Instead, here we compare farmers and the public's perceptions of each group's worry, in keeping with the analytical approach used for the other outcome variables. We will explore the 'accuracy' of these perceptions in a future study, although we still comment on the mismatch in perceptions in this report.

[27] When comparing the public living in Dublin with the public living outside of Dublin (and removing the control for region) as an exploratory analysis, we also found no significant difference between these two groups.

FIGURE 3.8 PARTICIPANTS' OWN CLIMATE CHANGE WORRY AND PERCEPTIONS OF OTHERS' WORRY



Source: Authors' analysis.
Notes: The figure uses survey weights and is scaled to 1 standard deviation (based on own worry). Error bars are 95% confidence intervals.

TABLE 3.8 GROUP DIFFERENCES IN PERCEPTIONS OF OTHERS' CLIMATE CHANGE WORRY

	Model A: 'How worried are Irish farmers?' (rated 1–7)			Model B: 'How worried are Irish people?' (rated 1–7)		
	Coef.	**SE**	**p-value**	**Coef.**	**SE**	**p-value**
Group *(base: farmer)*						
Rural public	-0.49	(0.10)	0.00	-0.17	(0.11)	0.12
Urban public	-0.39	(0.10)	0.00	-0.15	(0.11)	0.16
Age *(base: 45–54)*						
18–24	0.04	(0.14)	0.80	0.24	(0.16)	0.13
25–34	0.21	(0.12)	0.08	0.22	(0.13)	0.10
35–44	-0.03	(0.11)	0.79	0.14	(0.12)	0.24
55–64	0.20	(0.12)	0.09	0.44	(0.13)	0.00
65 or older	0.50	(0.13)	0.00	0.58	(0.14)	0.00
Female	0.29	(0.07)	0.00	0.28	(0.08)	0.00
University degree	0.09	(0.08)	0.23	0.07	(0.09)	0.41
Region *(base: Dublin)*						
Rest of Leinster	-0.13	(0.12)	0.28	-0.23	(0.13)	0.07
Munster	-0.15	(0.11)	0.18	-0.21	(0.13)	0.10
Connacht/Ulster	-0.32	(0.12)	0.01	-0.41	(0.13)	0.00
Constant	4.40	(0.15)	0.00	4.50	(0.16)	0.00
Observations	1657			1658		

Source: Authors' analysis.

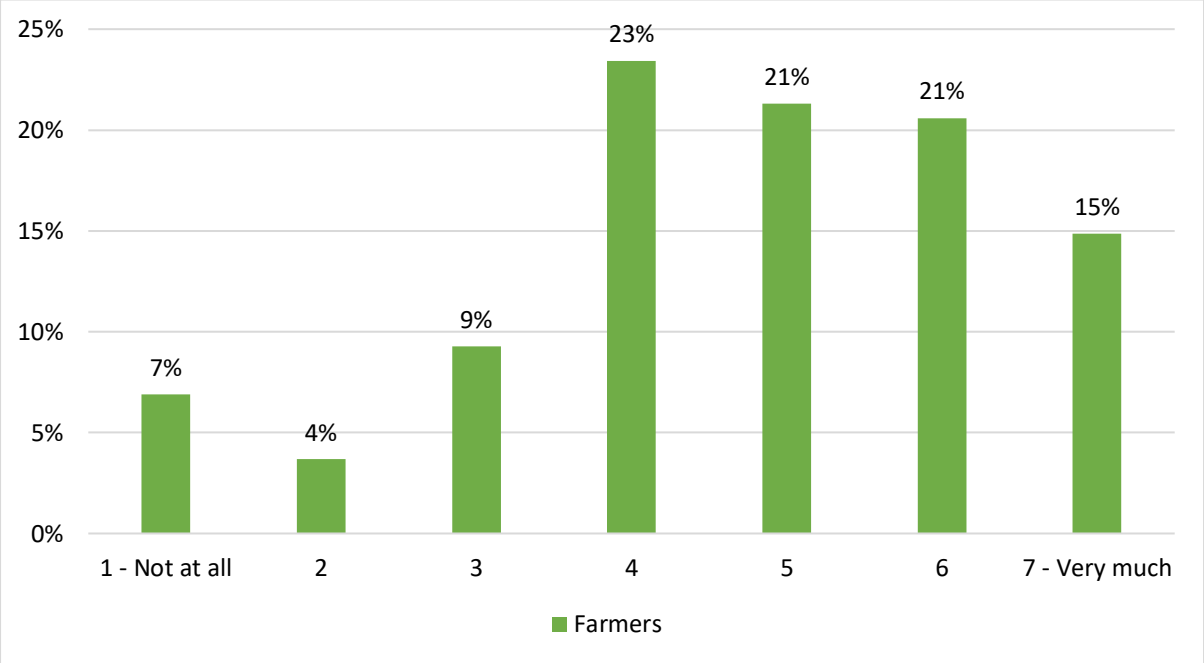
3.3 WILLINGNESS TO CHANGE

3.3.1 Farming practices

We asked farmers (not the public) several questions about farming practices and climate change. First, we asked farmers how much they consider climate change when making decisions about the way they farm (for example, whether they made changes to how they farm that help reduce climate change), on a seven-point numeric scale.[28] Overall, farmers reported being relatively conscious of climate change when making decisions about how they farm, with an average rating of 4.70 (SD=1.66).

Figure 3.9 shows the distribution of the extent to which farmers consider climate change in their farming decisions. While over one-third (36%) of farmers answered 6 or 7 to the question (highest levels of considering climate change), we also found some bimodality in the distribution, as 7% do not consider the climate at all.

FIGURE 3.9 DISTRIBUTION OF HOW MUCH FARMERS CONSIDER THE CLIMATE IN FARMING DECISIONS



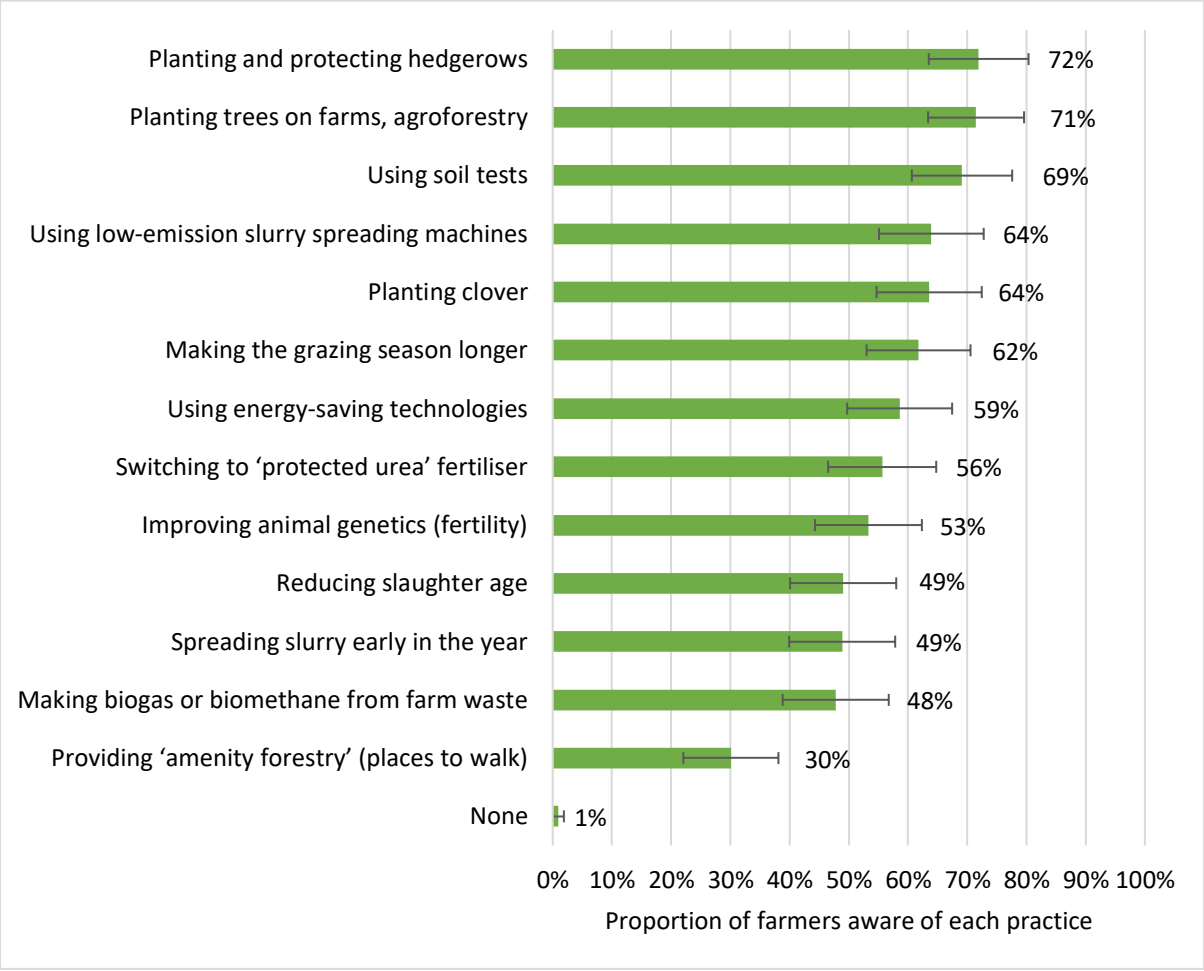
Source: Authors' analysis.
Notes: The figure uses survey weights.

[28] The aim of this question was to measure how much farmers consider their emissions when deciding on farming practices (i.e. climate change mitigation), rather than how much they consider how to minimise the impact of climate change on their farm (i.e. climate change adaptation). Based on the question wording, our analysis assumes that farmers correctly interpreted the question as being about mitigation, but a limitation of our study is that some farmers may have interpreted the question as (also) being about adaptation.

We then asked farmers about 13 farming practices that help mitigate climate change. For each practice, we asked farmers if they had heard of this practice (specifically as a practice that helps curb climate change). On average, farmers had heard about 7.43 practices (SD=4.0), i.e. a little over half (57%) of the practices listed.

Figure 3.10 shows the share of farmers who knew about each practice. More than half had heard about each practice, except for reducing slaughter age (49%), spreading slurry early (49%), making biogas (48%), and providing amenity forestry (30%). The most widely recognised practices included planting hedgerows (72%) and trees (71%), as well as using soil tests (69%).

FIGURE 3.10 FARMERS' AWARENESS OF FARMING PRACTICES THAT HELP MITIGATE CLIMATE CHANGE

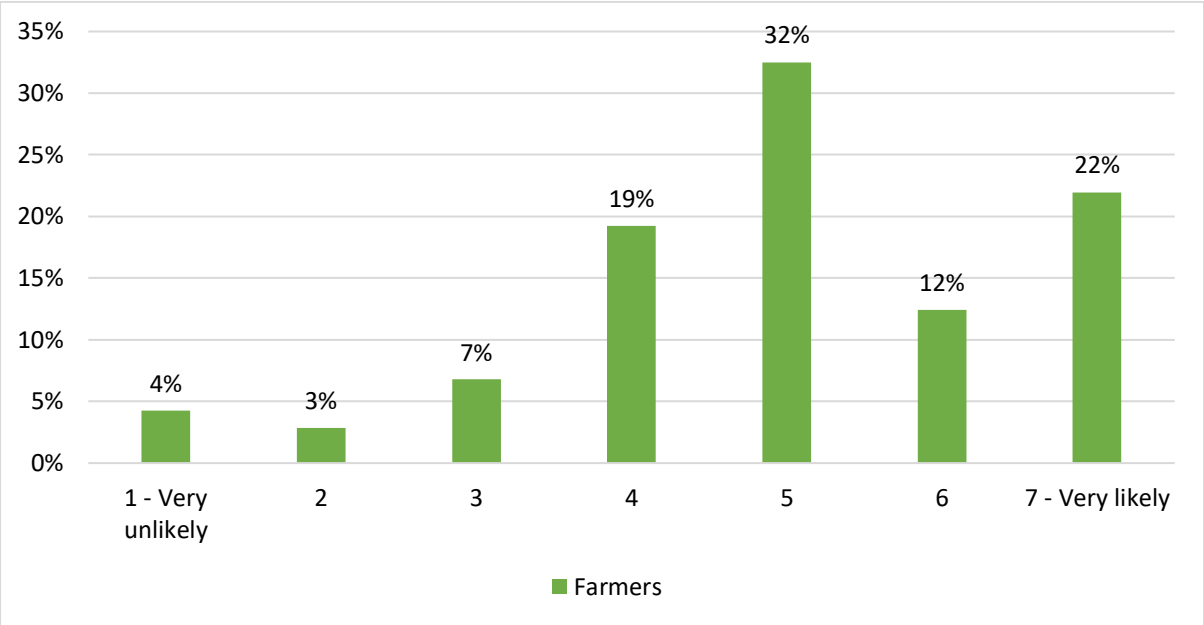


Source: Authors' analysis.
Notes: The figure uses survey weights. Error bars are 95% confidence intervals.

Finally, we asked farmers how likely they were to change how they farm in the future to help reduce climate change, thinking about the practices listed above, on a seven-point numeric scale. Farmers reported a relatively high likelihood of change, with an average rating of 4.98 (SD=1.55).

Figure 3.11 reports the distribution of farmers' likelihood of changing how they farm to help mitigate climate change. Over one-third of the farmers (34%) answered 6 or 7 to the question (highest level of likelihood). A very small minority (4%) stated they were 'very unlikely' to change.

FIGURE 3.11 DISTRIBUTION OF FARMERS' LIKELIHOOD OF ADOPTING SUSTAINABLE FARMING PRACTICES



Source: Authors' analysis.
Notes: The figure uses survey weights.

3.3.2 Lifestyle

We asked all participants how likely they were to change their lifestyle in the future to help reduce climate change (we provided a list of nine examples that included flying less, eating less meat, going car-free and improving home energy efficiency). Participants reported being fairly likely to change their lifestyle, with an average rating of 4.86 (SD=1.55). Group ratings were 4.75 (SD=1.52) for farmers, 4.83 (SD=1.59) for the rural and 4.95 (SD=1.53) for the urban public.

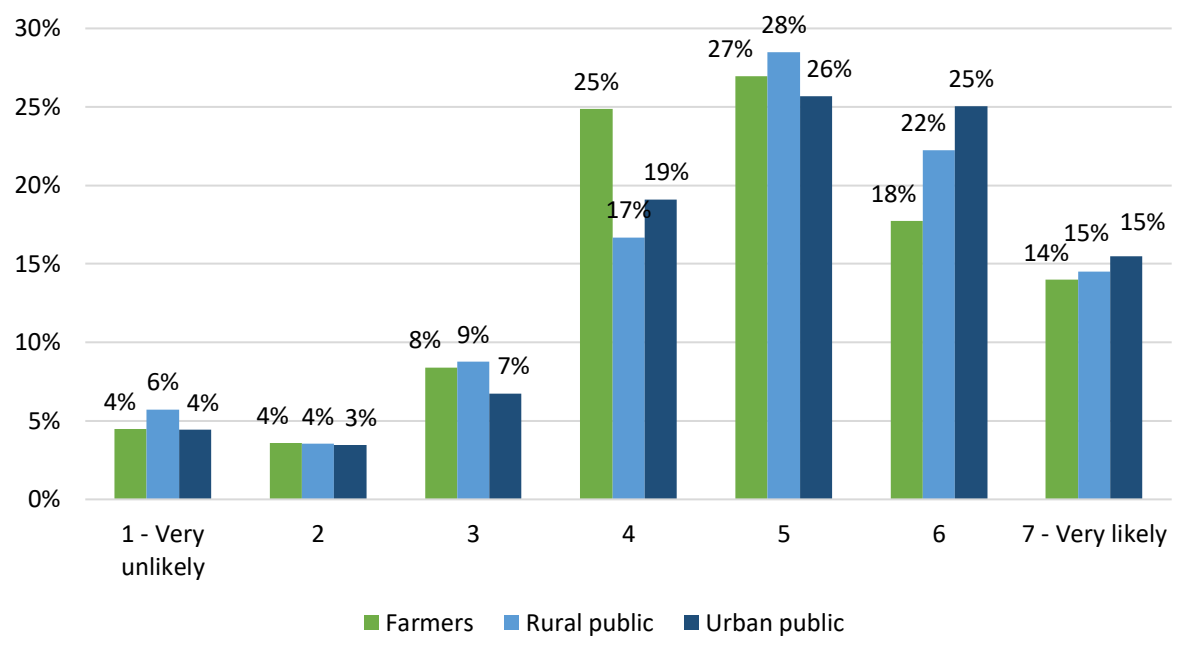
Figure 3.12 shows the distribution of the stated likelihood of lifestyle changes for each group. The distribution is relatively consistent across all three groups, although a larger share of the public reported high levels of willingness to change, compared to farmers. Over half of participants in each group reported a likelihood of 5 or above (59% of farmers, 65% of the rural public, and 66% of the urban public). A small minority (4–6%) of participants reported being 'very unlikely' to change.

In an exploratory (not pre-registered) linear regression model, we tested whether farmers differ from the rural and urban public in their likelihood of changing their lifestyle. The results are shown in Table 3.9. We found no significant difference between farmers and the rural public, nor between farmers and the urban public. We also found no significant difference between the rural and urban public when

using the rural public as base level in the model (b=0.06, p=0.52).[29]

In further models, we also found no significant differences between farmers and the rural and urban public when using an ordered logistic regression model (Table A.66 in Online Appendix), excluding the youngest age group (Table A.67), and excluding the online or in-person farmer sample (Table A.68). We also found broadly consistent results in models comparing different groups of farmers to the overall public, focusing on farm type and size, farmer experience, farm holder status, and occupation (Tables A.69–A.73).

FIGURE 3.12 DISTRIBUTION OF PARTICIPANTS' LIKELIHOOD OF SUSTAINABLE LIFESTYLE CHANGES



Source: Authors' analysis.
Notes: The figure uses survey weights.

[29] When comparing the public living in Dublin with the public living outside of Dublin (and removing the control for region) as an exploratory analysis, we also found no significant difference between these two groups.

TABLE 3.9 GROUP DIFFERENCES IN LIKELIHOOD OF SUSTAINABLE LIFESTYLE CHANGES

	How likely are you to change your lifestyle? (scored 1–7)		
	Coef.	**SE**	**p-value**
Group *(base: farmer)*			
Rural public	-0.11	(0.10)	0.30
Urban public	-0.04	(0.11)	0.68
Age *(base: 45–54)*			
18–24	0.16	(0.16)	0.31
25–34	0.17	(0.13)	0.19
35–44	-0.19	(0.12)	0.11
55–64	0.37	(0.13)	0.00
65 or older	0.17	(0.14)	0.21
Female	0.41	(0.08)	0.00
University degree	0.24	(0.08)	0.00
Region *(base: Dublin)*			
Rest of Leinster	-0.20	(0.13)	0.11
Munster	-0.26	(0.12)	0.04
Connacht or Ulster	-0.31	(0.13)	0.02
Constant	4.79	(0.16)	0.00
Observations	1659		

Source: Authors' analysis.

3.3.3 Perceptions about others' willingness

We asked participants how likely they thought Irish farmers were to adopt sustainable farming practices, and how likely they thought Irish people were to make sustainable lifestyle changes (we showed examples for both questions). We used the same seven-point numeric scale as when we asked about participants' own likelihoods. On average, participants estimated Irish farmers' likelihood of changing their practices at 4.62 (SD=1.46), and Irish people's likelihood of changing their lifestyle at 4.38 (SD=1.35).

Figure 3.13 shows participants' perceptions about their own and others' likelihood of changing. Panel A reports farmers' likelihood of changing their own practices (as in Section 3.3.1), and all groups' ratings of Irish farmers' likelihood. Panel B reports all groups' likelihood of changing their own lifestyle (as in Section 3.3.2), and their ratings of other Irish people's likelihood of changing. In both panels, participants rated their own likelihood above that of other people.

Table 3.10 shows the results of exploratory (not pre-registered) linear regression models testing whether farmers and the public differ in their perceptions of Irish farmers' likelihood of changing their farming practices (model A) and Irish people's

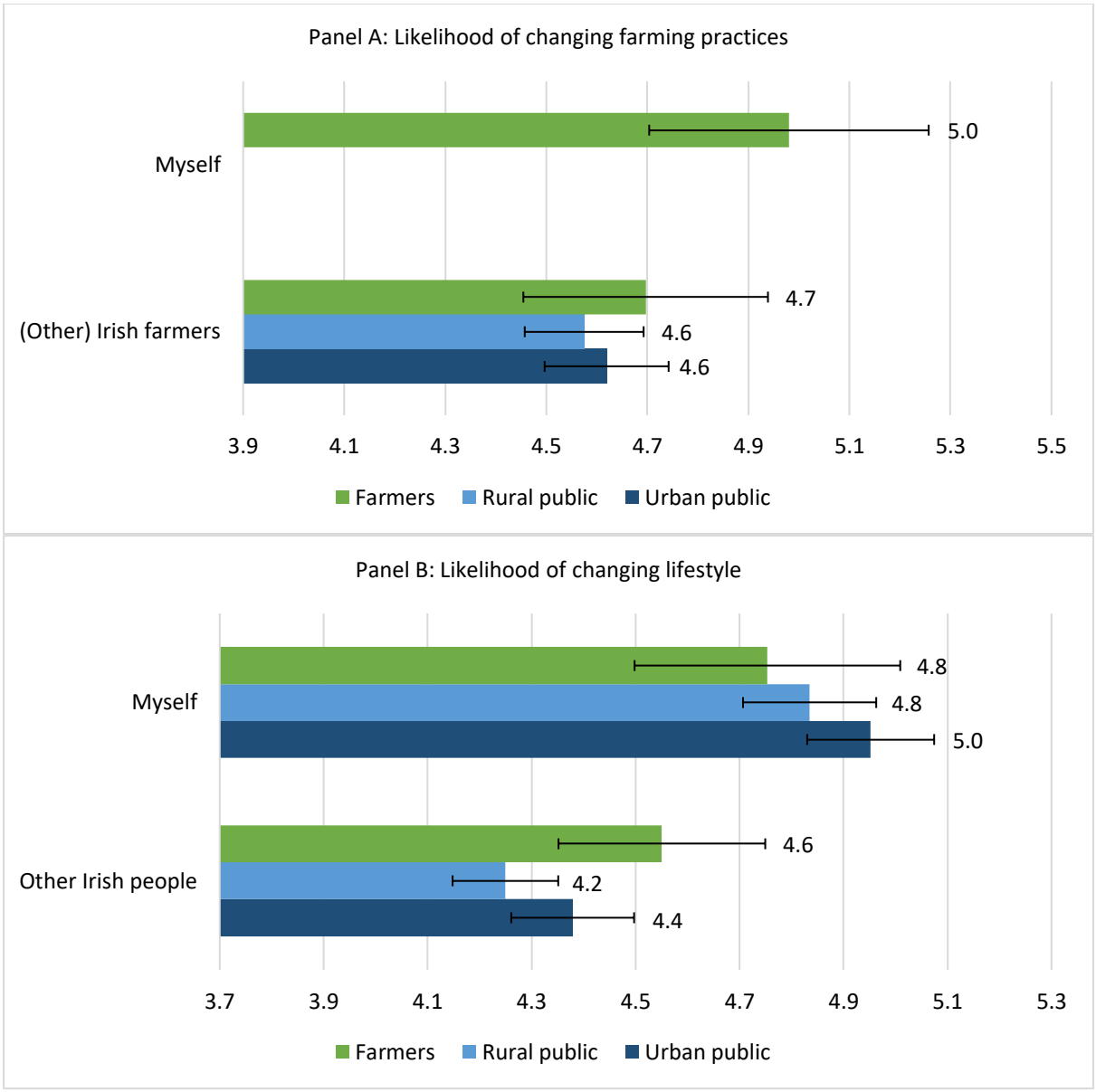
likelihood of changing their lifestyle (model B).[30] We found that compared to farmers, the rural and urban public saw Irish farmers as significantly less likely to change their practices (effect sizes equivalent to 0.18 and 0.24 SD, respectively), and they also saw Irish people as significantly less likely to change their lifestyle (effect sizes of 0.23 and 0.16 SD, respectively), though effect sizes were relatively small. We found no significant differences between the rural and urban public when using the rural public as a base level (model A: b=-0.08, p=0.41; model B: b=0.10, p=0.25).[31]

We found consistent results in models using ordered logistic regressions (Table A.74 in Online Appendix), excluding the youngest age group (Table A.75), and excluding the online or in-person farmer samples (Table A.76), although some differences in the latter model were no longer statistically significant. We also compared different groups of farmers to the overall public, focusing on farm type and size, farmer experience, farm holder status, and farmer occupation (Tables A.77–A.81), and we also found consistent coefficient signs (except for crops farmers' perceptions of Irish farmers' likelihood of changing practices), although differences were not always statistically significant.

[30] As discussed in Section 2.5.1, the pre-registration planned for testing whether farmers and the public's perceptions of their peers and each other's willingness are 'accurate' by comparing perceptions of each group to this group's actual (average own) willingness using t-tests. Instead, here we compare farmers and the public's perceptions of each group's willingness, in keeping with the analytical approach used for the other outcome variables. We will explore the 'accuracy' of these perceptions in a future study, although we still comment on the mismatch in perceptions in this report. In addition, the pre-registration included secondary analyses regressing own willingness on peer group (or other group) willingness, which we did not pursue after further investigation into the reverse causality issues such models would create.

[31] When comparing the public living in Dublin with the public living outside of Dublin (and removing the control for region) as an exploratory analysis, we also found no significant difference between these two groups, except that the public outside Dublin rated farmers' likelihood of changing lower (b=-0.22, p=0.05) than the public in Dublin.

FIGURE 3.13 PARTICIPANTS' LIKELIHOOD OF CHANGING AND PERCEPTIONS OF OTHERS' LIKELIHOOD



Source: Authors' analysis.
Notes: The figure uses survey weights. Panels are rescaled to 1 standard deviation (based on own likelihood). Error bars are 95% confidence intervals.

TABLE 3.10 GROUP DIFFERENCES IN PERCEPTIONS OF OTHERS' LIKELIHOOD OF CHANGING

	Model A: 'How likely are Irish farmers to change practices?' (1–7)			Model B: 'How likely are Irish people to change lifestyle?' (1–7)		
	Coef.	SE	p-value	Coef.	SE	p-value
Group *(base: farmer)*						
Rural public	-0.27	(0.10)	0.01	-0.31	(0.09)	0.00
Urban public	-0.35	(0.10)	0.00	-0.21	(0.09)	0.02
Age *(base: 45–54)*						
18–24	-0.20	(0.15)	0.17	-0.18	(0.14)	0.18
25–34	0.14	(0.12)	0.24	0.21	(0.12)	0.07
35–44	-0.02	(0.11)	0.83	-0.04	(0.11)	0.70
55–64	0.08	(0.12)	0.50	0.36	(0.12)	0.00
65 or older	0.33	(0.13)	0.01	0.27	(0.12)	0.03
Female	0.06	(0.07)	0.45	0.24	(0.07)	0.00
University degree	-0.00	(0.08)	0.99	0.06	(0.07)	0.43
Region *(base: Dublin)*						
Rest of Leinster	-0.31	(0.12)	0.01	-0.05	(0.11)	0.66
Munster	-0.21	(0.12)	0.07	-0.09	(0.11)	0.42
Connacht/Ulster	-0.41	(0.12)	0.00	-0.26	(0.12)	0.02
Constant	5.05	(0.15)	0.00	4.41	(0.14)	0.00
Observations	1657			1659		

Source: Authors' analysis.

3.4 POLICY PERCEPTIONS

3.4.1 Overall policy perceptions

We asked participants to rate how much they would support 12 different climate policies (each participant saw six policies to limit survey length), and how fair and effective they thought each policy would be. For each policy, each of the three questions were rated using seven-point numeric scales.

Overall, participants were supportive of climate policies, with an average pooled rating of 4.57 (SD=1.99). By group, average support was 4.45 for farmers (SD=2.09), 4.61 for the rural public (SD=1.98), and 4.62 for the urban public (SD=1.92). Participants rated fairness slightly lower (4.46, SD=1.92) and effectiveness slightly higher (4.72, SD=1.87) than support (see Table A.82 in Online Appendix for more details).

Figure 3.14 (panel A) shows the distribution of policy support, pooling all policies. This distribution therefore includes 9,936 observations (six per participant). While support was at 5 or above for over half of all policy ratings in all groups, we also observed clear bimodality in this distribution, with the proportion of '1' ratings ('fully oppose') including 17% of farmer ratings, 13% of rural public ratings, and 12% of urban public ratings. We observed a similar pattern in the fairness and effectiveness distributions (see Figures A.4 and A.5 in Online Appendix).

Panel B in Figure 3.14 shows the distribution of participants' mean policy support (i.e. the average of each participant's six policy support ratings). This distribution includes one observation per participant with a value ranging from 1–7, including non-integer values (as the outcome is an average). This exploratory analysis (not pre-registered) clarifies that the bimodality observed in Panel A is mostly not due to participants who consistently oppose policies. Only a very small minority, including 0.4% of farmers, 1.5% of the rural public, and 2.5% of the urban public, fully opposed all climate policies. Rather, the distribution in Panel A arises because several individual policies had a minority strongly opposed, even though those people were not opposed to climate policy in general (see also next paragraph). Average support was high, with most participants being more supportive than not (62% of farmers, 68% of rural public, 70% of urban public).

Figure 3.15 shows average support ratings for each individual policy. Restrictive policies were rated lower than non-restrictive policies, with the exception of mandatory renewable energy (restrictive policy rated in top half) and subsidising farmers to switch to plant-based farming (non-restrictive policy rated in bottom half). The most supported policies were increasing home retrofitting grants and helping farmers take up energy-saving technologies, while the least supported policies were reducing the national herd size and taxing meat, followed by taxing flights. Ratings were relatively consistent across groups, with the largest gap between groups observed in the least supported policy (reducing national herd size). Aside from the three least supported policies, all policies had average ratings above the midpoint (based on the full sample average). Importantly, examining the distribution of support ratings by policy showed a high level of variation in the size of the 'fully opposed' group (rating of 1): fewer than 3% fully opposed increasing home retrofit grants and helping farmers take up green technologies, while more than 30% fully opposed meat and flight taxes and reducing the national herd size.[32] Finally, fairness and effectiveness rankings were broadly in line with support, with some small differences for policies that received medium support (see Figures A.6 and A.7 in Online Appendix).

We tested differences between farmers' and the rural and urban public's overall support for policies, using exploratory (not pre-registered) linear regression models pooling all policies together (i.e. six observations per person, standard

[32] The weighted shares of 'fully opposed' participants for each policy were: 31% for meat tax (39% farmers, 31% rural, 25% urban); 10% for subsidising switching to plant-based farming (13% farmers, 9% rural, 9% urban); 8% for funding green air travel research (10% farmers, 6% rural, 8% urban); 14% for car-free city centres (9% farmers, 15% rural, 18% urban); 7% for giving sustainable corporations tax breaks (5% farmers, 6% rural, 8% urban); 7% for making renewable energy mandatory (7% farmers, 7% rural, 7% urban); 34% for reducing the national herd size (63% of farmers, 25% of rural, 20% of urban); 3% for helping farmers take up green technologies (4% farmers, 2% rural, 3% urban); 30% for flight taxes (28% farmers, 32% rural, 30% urban); 6% for improving public transport (10% farmers, 6% rural, 3% urban); 11% for stopping natural gas subsidies (15% farmers, 10% rural, 9% urban); and 2% for increasing home retrofit grant (1% farmers, 3% rural, 1% public).

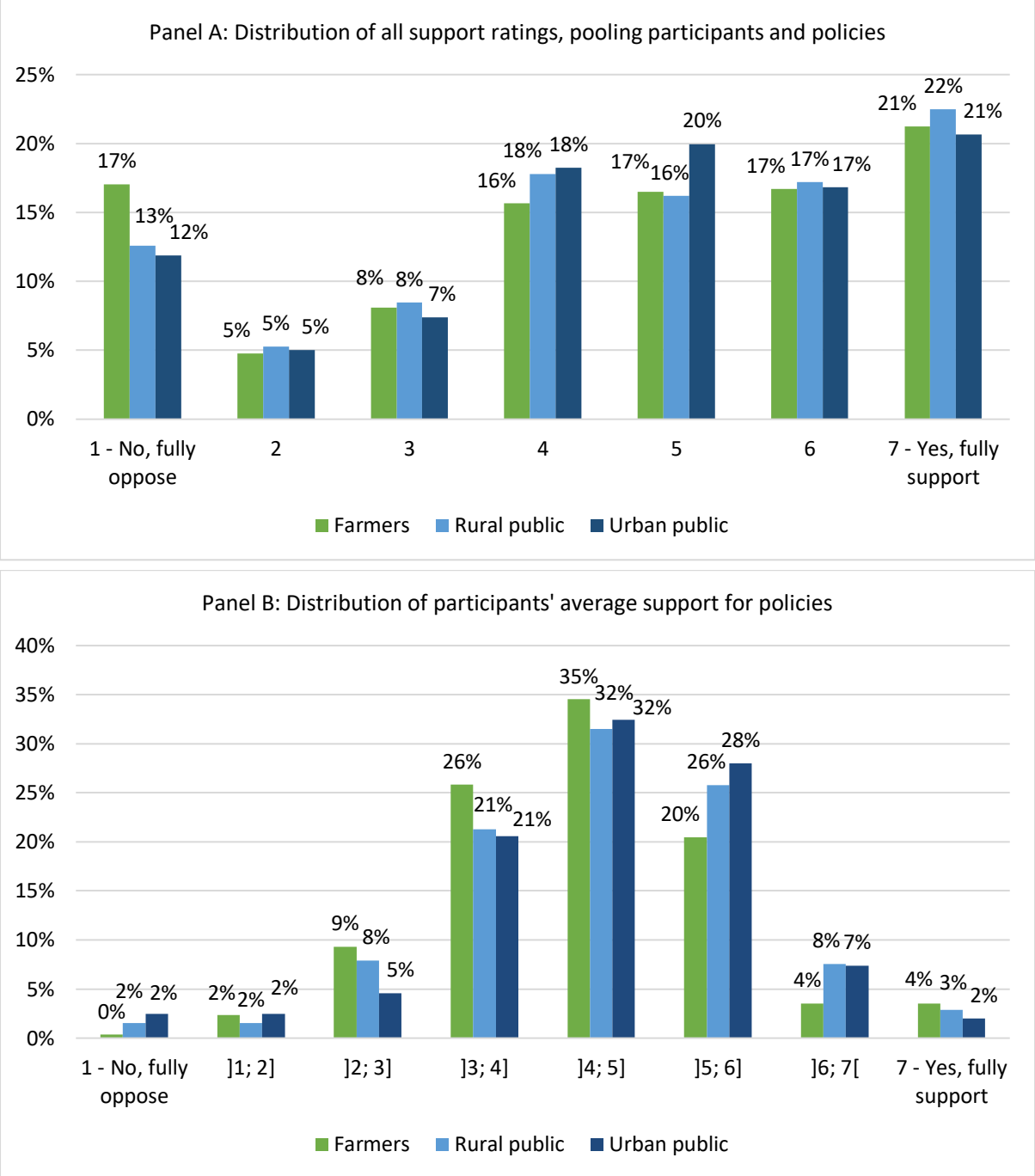
errors are clustered at the person level, random intercepts by person).[33] The results are shown in Table 3.11. We found no significant differences between farmers and the rural public, nor between farmers and the urban public, even when controlling for policy restrictiveness and policy domain. We also found no significant differences between the rural and urban public when changing base levels to rural public (model C: b=0.00, p=0.98).[34] Finally, we found significantly lower support for restrictive policies (effect size=0.65 SD in Model C).

We found no significant differences in further extensions of model C using an ordered logistic regression model (see Table A.83 in Online Appendix), excluding farming policies (Table A.84), excluding the youngest age group (Table A.85), and excluding the online and in-person farmer samples in turn (Table A.86). We also compared different groups of farmers to the overall public, focusing on farm type, size, farmer experience, farm holder status, and farmer occupation (Tables A.87–A.91), and we found consistent results, except that those with a farm holder relative or spouse as well as occasional farmers reported significantly lower overall support (note those two categories overlap by over 50% in our sample).

[33] The pre-registration did not include this model as we originally registered descriptive statistics and within-person models to confirm rankings. However, to better fit the study aim of comparing the perceptions of farmers and the public (rather than measuring absolute support for each policy), we instead report here on differences in overall policy support by group, controlling for policy domain and restrictiveness. We still also comment on policy rankings using descriptive statistics.

[34] When comparing the public living in Dublin with the public living outside of Dublin (and removing the control for region) as an exploratory analysis, we also found no significant difference between these two groups.

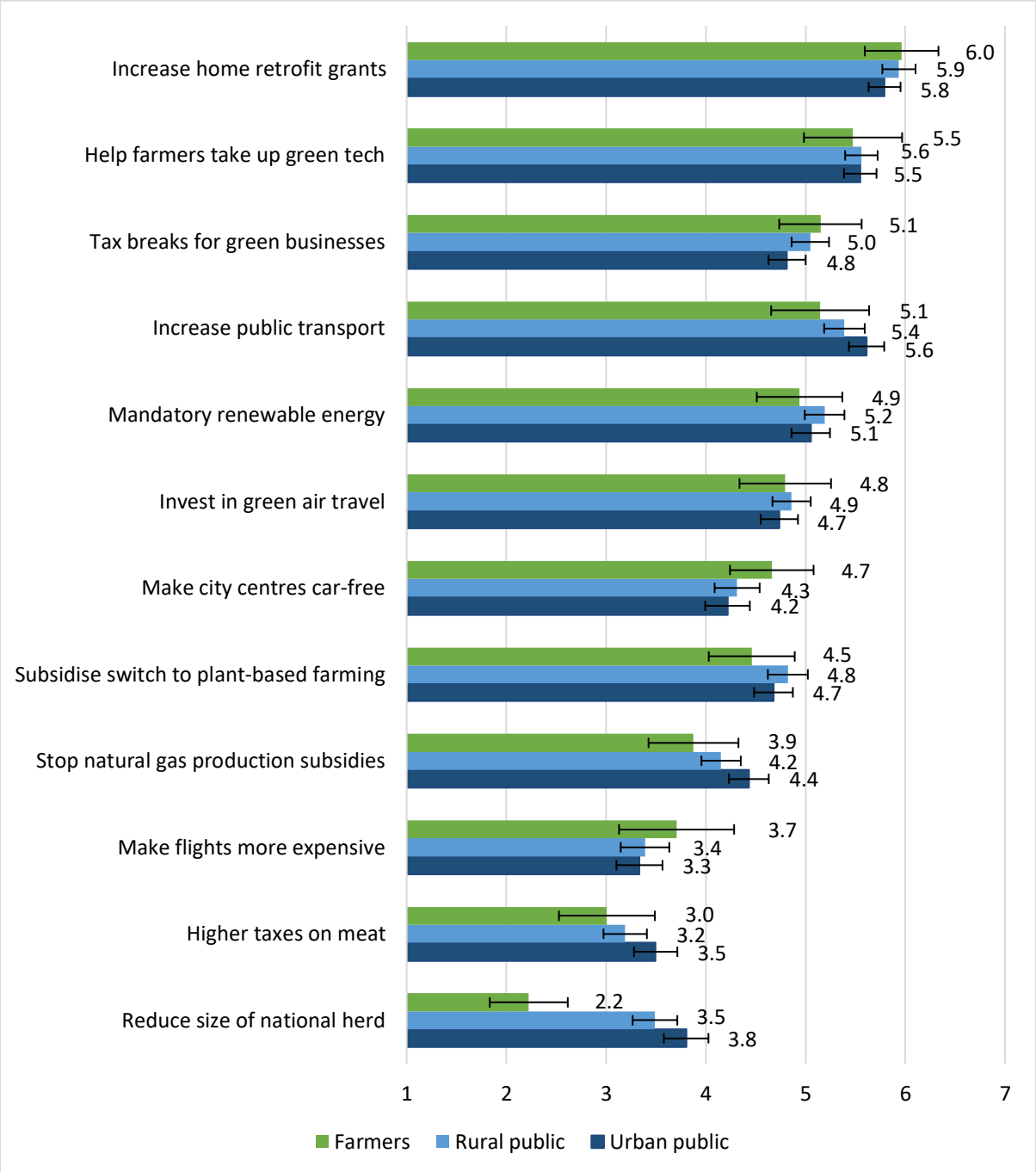
FIGURE 3.14 DISTRIBUTION OF PARTICIPANTS' SUPPORT FOR CLIMATE POLICIES



Source: Authors' analysis.

Notes: The figure uses survey weights. Panel A shows the distribution of all the policy support ratings. It includes 9,936 observations (six observations per person, each representing a specific policy rating). Panel B shows the distribution of participants' average policy support (calculated based on the six policies that each participant saw). It includes 1,659 observations (one observation per person). Note there are more than seven possible values for this variable (aggregated into buckets in the figure) since it is an average of six ratings. Percentages may not add up to exactly 100 due to rounding.

FIGURE 3.15 AVERAGE SUPPORT FOR EACH CLIMATE POLICY



Source: Authors' analysis.
Notes: The figure uses survey weights. Error bars are 95% confidence intervals.

TABLE 3.11 GROUP DIFFERENCES IN SUPPORT FOR CLIMATE POLICIES (POOLING ALL POLICIES)

	Policy support (rated 1–7), pooling all policies together								
	Model A			Model B			Model C		
	Coef.	SE	p	Coef.	SE	p	Coef.	SE	p
Group *(base: farmer)*									
Rural public	0.07	(0.08)	0.35	0.07	(0.08)	0.35	0.07	(0.08)	0.35
Urban public	0.08	(0.08)	0.35	0.08	(0.08)	0.34	0.08	(0.08)	0.35
Restrictive				-1.29	(0.04)	0.00	-1.29	(0.04)	0.00
Domain *(base: farming)*									
Flying							-0.01	(0.05)	0.86
Driving							0.72	(0.04)	0.00
Energy							1.28	(0.04)	0.00
Industry							0.45	(0.04)	0.00
Age *(base: 45–54)*									
18–24	0.20	(0.11)	0.08	0.20	(0.11)	0.08	0.19	(0.11)	0.08
25–34	0.10	(0.10)	0.32	0.10	(0.10)	0.32	0.10	(0.10)	0.33
35–44	-0.20	(0.10)	0.03	-0.20	(0.10)	0.03	-0.20	(0.10)	0.03
55–64	0.12	(0.10)	0.21	0.12	(0.10)	0.21	0.12	(0.10)	0.21
65 or older	0.24	(0.11)	0.03	0.24	(0.11)	0.03	0.24	(0.11)	0.03
Female	0.10	(0.06)	0.09	0.10	(0.06)	0.09	0.10	(0.06)	0.09
University degree	0.14	(0.06)	0.02	0.14	(0.06)	0.03	0.14	(0.06)	0.02
Region *(base: Dublin)*									
Rest of Leinster	-0.04	(0.10)	0.68	-0.04	(0.10)	0.68	-0.04	(0.10)	0.67
Munster	0.05	(0.10)	0.65	0.05	(0.10)	0.64	0.04	(0.10)	0.65
Connacht/Ulster	-0.08	(0.10)	0.45	-0.08	(0.10)	0.45	-0.08	(0.10)	0.44
Constant	4.42	(0.12)	0.00	5.06	(0.13)	0.00	4.66	(0.13)	0.00
Observations	9930			9930			9930		

Source: Authors' analysis.
Note: There are six observations per person. The model includes random intercepts and clustered standard errors by person.

3.4.2 Farming policies

In this section, we report on participants' perceptions of climate policies that target farming. Section 3.4.1 (see Figure 3.15) discussed descriptive results about farming policies in comparison to other climate policies, with restrictive farming policies ranking in the bottom three policies for all groups. Participants reported an average support of 3.25 (SD=2.05) for reducing the national herd size, 3.26 (SD=1.95) for higher taxes on meat, 4.67 (SD=1.80) for subsidising farmers to switch to plant-based farming or forestry, and 5.53 (SD=1.51) for helping farmers take up energy-saving technologies (see Figure 3.15 for support by group, and Figures A.6 and A.7 in Online Appendix for fairness and effectiveness ratings).

Figure 3.16 shows the distribution of support for each farming policy. The two restrictive policies, reducing the national herd size (Panel A) and introducing a meat tax (Panel B), are bimodal: a significant share of participants 'fully oppose' reducing the herd size (63% of farmers, 25% of rural public, 20% of urban public) or a meat tax (39% of farmers, 31% of rural public, 25% of urban public), but there is also a

concentration of participants at the midpoint of the scale for both policies, with a significant share rating support as 4 or above for the herd size policy (25% of farmers, 53% of rural public, 59% of urban public) and the meat tax policy (43% of farmers, 45% of rural public, 52% of urban public).

Support for subsidising farmers to switch to plant-based agriculture (Figure 3.16, Panel C) was also bimodal: most participants rated support as 4 or above, but a minority of participants (13% of farmers, 9% of rural public, 9% of urban public) 'fully oppose' the policy. Finally, support for assistance programmes to help farmers take up energy-saving technologies (Panel D) was high, with over 30% of all groups who 'fully support' the policy.

We tested whether farmers and the rural and urban public differed in their support for farming policies. We used one linear regression model with socio-demographic controls for each policy, as the distribution of support varied by policy, including within the two non-restrictive policies.[35] The results are shown in Table 3.12. Farmers reported significantly higher support than the rural or urban public for helping farmers take up energy-saving technologies, and significantly lower support than the rural or urban public for the other policies, including the two restrictive policies (meat tax and reducing herd size), but also the non-restrictive policy on subsidising farmers to switch to plant-based farming or forestry. The largest differences were on the herd size policy (equivalent to 0.43 and 0.55 SD for the rural and urban public, respectively). The smallest differences were on helping farmers take up energy-saving technologies (equivalent to 0.19 SD for both the rural and the urban public). We found no significant differences between the urban and the rural public when changing base levels to the rural public (Model A: b=0.24, p=0.18; Model B: b=0.05, p=0.80; Model C: b=-0.11, p=0.53; Model D: b=0.00, p=0.98).[36]

We found consistent results in further models using ordered logistic regressions (see Table A.92 in Online Appendix), excluding the youngest age group (Table A.93), and excluding online or in-person farmers (Tables A.94 and A.95; signs were consistent but some coefficients lost statistical significance).

We also compared different groups of farmers to the overall public, focusing on farm type and size, farmer experience, farm holder status, and farmer occupation (Tables A.96–A.100 in Online Appendix). We found mostly consistent results, as the signs of coefficients (i.e. direction of the differences) were consistent with the main model, although coefficients were often not statistically significant, likely due to lower statistical power. There were several exceptions where the direction of the difference was reversed, though none of these coefficients were statistically

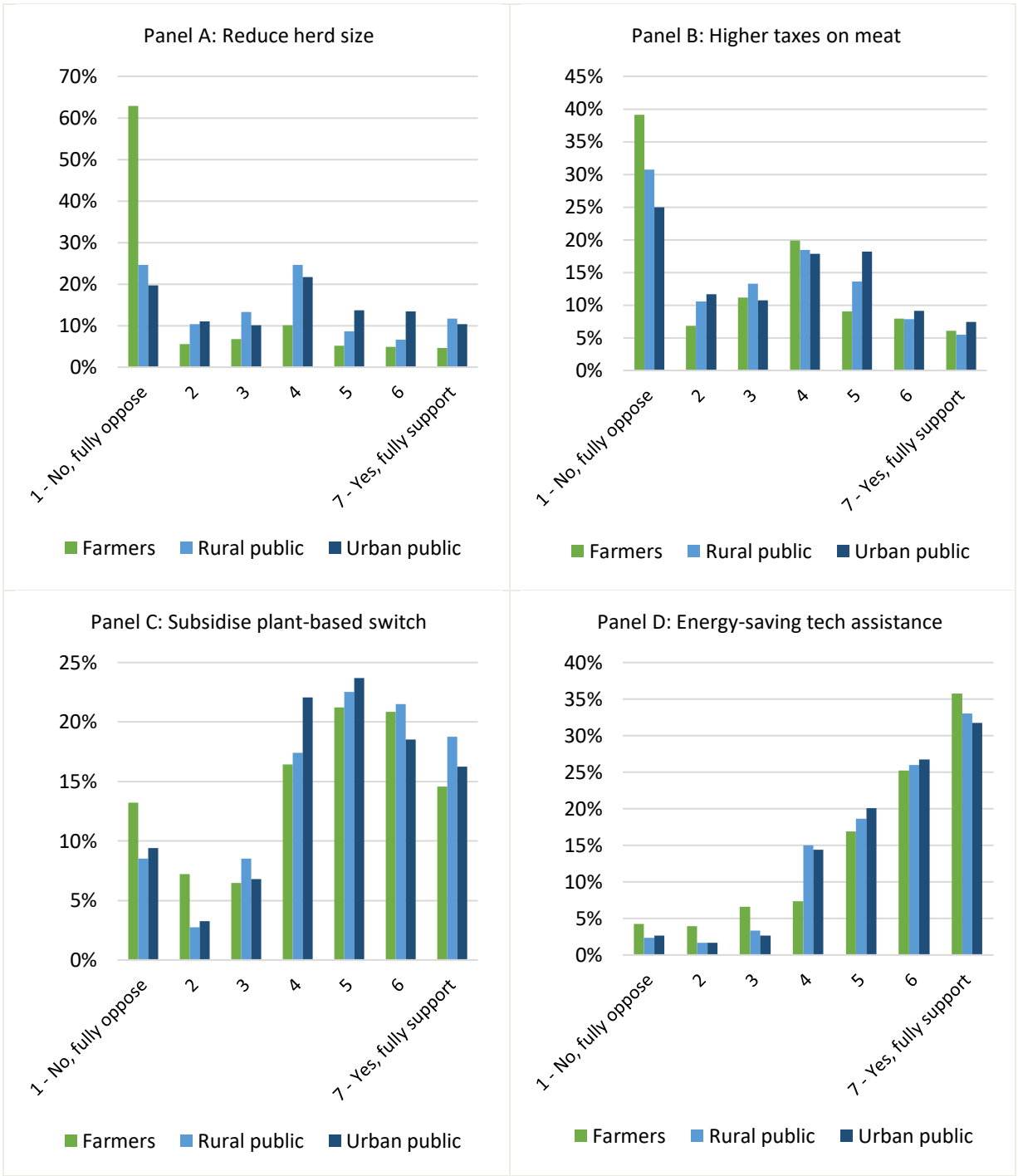
[35] The pre-registration planned for a single (multi-level) model including all four policies and controlling for restrictiveness, but we used one model per policy after observing in Figure 3.16 that the non-restrictive farming policy distributions differ.

[36] When comparing the public living in Dublin with the public living outside of Dublin (and removing the control for region) as an exploratory analysis, we also found no significant difference between these two groups.

significant: crops farmers for meat tax and plant-based subsidy; new farmers (0–5 years) for meat tax and energy-saving technology; and relatives of farm holders and small farmers (<20 hectares) for energy-saving technology.

Finally, we examined group differences in the fairness and effectiveness ratings of farming policies. Results were consistent with Table 3.12, except that fairness differences between farmers and the public were not statistically significant for Model D (technologies) (see Tables A.101 and A.102 in Online Appendix).

FIGURE 3.16 DISTRIBUTION OF PARTICIPANTS' SUPPORT FOR CLIMATE POLICIES TARGETING FARMING



Source: Authors' analysis.
Notes: The figure uses survey weights.

TABLE 3.12 GROUP DIFFERENCES IN SUPPORT FOR POLICIES TARGETING FARMING

	Policy support (rated 1–7)							
	Model A: Reduce herd size		Model B: Higher taxes on meat		Model C: Plant-based subsidies		Model D: Help farm green tech	
	b (SE)	p	b (SE)	p	b (SE)	p	b (SE)	p
Group *(base: farmer)*								
Rural public	0.88	0.00	0.48	0.01	0.59	0.00	-0.28	0.04
	(0.19)		(0.18)		(0.18)		(0.14)	
Urban public	1.12	0.00	0.52	0.01	0.48	0.01	-0.28	0.04
	(0.19)		(0.19)		(0.18)		(0.14)	
Age *(base: 45–54)*								
18–24	-0.15	0.60	0.66	0.02	0.17	0.54	0.10	0.62
	(0.28)		(0.28)		(0.27)		(0.20)	
25–34	0.11	0.64	0.63	0.01	0.08	0.71	-0.08	0.63
	(0.24)		(0.23)		(0.22)		(0.17)	
35–44	-0.11	0.62	-0.03	0.87	-0.18	0.38	0.01	0.93
	(0.22)		(0.21)		(0.20)		(0.16)	
55–64	0.22	0.36	0.20	0.38	0.10	0.66	0.11	0.51
	(0.24)		(0.23)		(0.22)		(0.17)	
65 or older	0.21	0.38	0.32	0.19	0.30	0.19	0.27	0.13
	(0.25)		(0.24)		(0.23)		(0.17)	
Female	-0.16	0.26	0.45	0.00	0.17	0.19	0.09	0.39
	(0.14)		(0.14)		(0.13)		(0.10)	
University degree	-0.22	0.16	0.07	0.65	0.20	0.16	0.28	0.01
	(0.15)		(0.15)		(0.14)		(0.11)	
Region *(base: Dublin)*								
Rest of Leinster	-0.19	0.43	-0.39	0.08	0.20	0.34	-0.12	0.46
	(0.24)		(0.22)		(0.21)		(0.17)	
Munster	-0.21	0.35	-0.43	0.05	0.25	0.24	-0.04	0.79
	(0.23)		(0.22)		(0.21)		(0.16)	
Connacht/Ulster	-0.22	0.36	-0.64	0.01	-0.21	0.34	0.01	0.96
	(0.24)		(0.23)		(0.22)		(0.17)	
Constant	2.94	0.00	2.73	0.00	3.93	0.00	5.69	0.00
	(0.30)		(0.28)		(0.27)		(0.21)	
Observations	820		835		835		821	

Source: Authors' analysis.
Note: Each participant was asked about either policies A and D, or policies B and C.

3.4.3 Role of knowledge and concern

In a final set of analyses, we tested how knowledge and concern about climate change impact policy perceptions (i.e. the outcome measures analysed in Sections 3.4.1 and 3.4.2), as well as willingness to change lifestyle, and (for farmers) willingness to change farming practices (i.e. the outcome measures analysed in Sections 3.3.1 and 3.3.2).

First, we tested whether participants who knew more about climate change or who were more worried about it were more supportive of climate policies. To do this, we added knowledge and concern about climate change (see Sections 3.1 and 3.2) to the linear regression models used to test differences in policy support between farmers and the public in Section 3.4.1. The models pool all policies (i.e. six observations per person, random intercepts and clustered standard errors by person, controls for domain and restrictiveness).[37]

Table 3.13 shows the results of this analysis. Concern was associated with significantly higher policy support (effect size equivalent to 0.21 SD). All three types of knowledge were also associated with higher policy support, but effect sizes were small and once combined into a single model with concern, only knowledge about high-emissions sectors was statistically significant (effect size equivalent to 0.06 SD). We found consistent results in models using an ordered logistic regression (see Table A.104 in Online Appendix), excluding the youngest age group (Table A.105), excluding farming policies (Table A.106), and excluding online or in-person farmers (Table A.107).

As an exploratory analysis (not pre-registered), we tested the role of knowledge and concern in support for farming policies (see Table A.108 in Online Appendix). For each farming policy, we used a linear regression of support on knowledge, concern, group (farmer, rural or urban public), and socio-demographics. We found consistent results for concern, which was significantly positively associated with policy support. Knowledge effects varied. Knowledge about high-emissions sectors was significantly and positively associated with support for restrictive policies (cutting herd size and taxing meat) but not non-restrictive policies (subsidising green farm tech and switching to plant-based farming). Knowledge about the effects of climate change was associated with lower support for restrictive farming policies and higher support for helping farmers take up energy-saving technologies (no association for plant-based subsidies). There were no significant effects for knowledge about effective climate actions.

Finally, as another exploratory analysis (not pre-registered), we tested whether knowledge or concern increase willingness to take action using linear regressions of willingness to change farming practices (farmers only) and lifestyle (all) on knowledge, concern, and socio-demographic controls (including whether the participant is a farmer or from the rural or urban public in the second model)

[37] We deviated from the pre-registration for this analysis. Initially we planned to interact knowledge and concern with restrictiveness (one model per independent variable) to test if knowledge or concern reduces the gap in support between restrictive and non-restrictive policies. Instead, here we combined all knowledge variables into one model to better understand the overall role of knowledge, hence adding interactions with restrictiveness would add too much complexity and we now use restrictiveness as a control variable only. However, we still conducted the pre-registered analysis (results in Table A.103 in Online Appendix). This analysis found a small positive significant interaction with concern, no significant interactions with sectors and actions knowledge, and a negative significant interaction with effects knowledge. In other words, knowledge and concern are not sufficient to close the support gap between non-restrictive and restrictive policies.

(see Table A.109 in Online Appendix). We found that concern was significantly and positively associated with a higher willingness to change both lifestyle and farming practices, and so was knowledge about effects of climate change. In addition, knowledge about sectors driving climate change was also significantly and positively associated with a higher willingness to change farming practices. There were no other significant associations between knowledge and willingness (including knowledge about effective climate actions).

TABLE 3.13 ROLE OF KNOWLEDGE AND CONCERN IN POLICY SUPPORT

	Policy support (rated 1–7)									
	Model A		Model B		Model C		Model D		Model E	
	b (SE)	p	b (SE)	P	b (SE)	p	b (SE)	p	b (SE)	p
Group *(base: farmer)*										
Rural public	0.06	0.44	0.07	0.38	0.04	0.62	0.04	0.65	0.12	0.09
	(0.08)		(0.08)		(0.08)		(0.08)		(0.07)	
Urban public	0.08	0.34	0.07	0.41	0.05	0.54	0.05	0.53	0.09	0.19
	(0.08)		(0.08)		(0.08)		(0.08)		(0.07)	
Effects	0.10	0.00					0.07	0.03	0.00	0.99
knowledge	(0.03)						(0.03)		(0.02)	
Sectors			0.17	0.00			0.13	0.01	0.12	0.00
knowledge			(0.05)				(0.05)		(0.04)	
Actions					0.07	0.01	0.04	0.09	-0.02	0.41
knowledge					(0.03)		(0.03)		(0.02)	
Concern									0.42	0.00
									(0.02)	
Restrictive	-1.29	0.00	-1.30	0.00	-1.29	0.00	-1.30	0.00	-1.30	0.00
	(0.04)		(0.04)		(0.04)		(0.04)		(0.04)	
Policy domain	Yes		Yes		Yes		Yes		Yes	
Demographics	Yes		Yes		Yes		Yes		Yes	
Constant	4.26	0.00	4.39	0.00	4.50	0.00	4.06	0.00	2.62	0.00
	(0.18)		(0.15)		(0.14)		(0.20)		(0.17)	
Observations	9902		9792		9892		9746		9746	

Source: Authors' analysis.
Note: There are six observations per person. The model includes random intercepts and clustered standard errors by person. Demographic controls are age, gender, degree and region. Policy domain is a categorical control variable. Discrepancies in observations are due to excluding small numbers of participants who did not follow instructions in each knowledge question.

CHAPTER 4

Discussion

We set out to investigate differences in how urban residents, rural residents and farmers think about climate change. We surveyed their knowledge of its causes and effects, how worried they are about it, their willingness to take climate action and their perceptions of others' concern and willingness. In this chapter, we summarise the findings to identify broader themes and highlight their implications for policy.

4.1 FINDINGS SUMMARY

The results generate four broad themes of particular relevance for climate policy.

4.1.1 Knowledge of climate change is poor

The first general finding is that factual knowledge on the causes and effects of climate change is poor. Across all groups, responses to incentivised multiple-choice questions were near chance levels (i.e. the score participants would have received if they chose answers at random). Despite agriculture being the highest-emitting sector in Ireland, over one in three failed to rank it in the top half of sectoral emitters. This finding aligns with previous estimates (O'Mahony et al., 2024; Timmons and Lunn, 2022), indicating no improvement in the public's awareness of agriculture's contribution to greenhouse gas (GHG) emissions in recent years. Note that farmers and the general public equally underestimate the impact of agriculture.

Understanding of which actions are most effective at reducing carbon emissions remains similarly poor. While many participants correctly identified reducing food waste, washing clothes in cold water and hang-drying clothes as impactful, most did not identify avoiding air travel and switching to a plant-based diet, despite these being the two most impactful actions of all actions presented (according to global estimates from Wynes and Nicholas, 2017).

Identifying effective climate actions emerged as the only consistent difference between farmers and the public, with farmers performing significantly worse than chance and the public doing slightly better. Exploratory analyses revealed that farmers were especially less likely than the public to recognise the impact of eating a plant-based diet, compared to other climate actions. The effect was driven by specific subgroups of farmers: beef and dairy farmers, those who had been farming for longer and those with larger farms. This pattern is consistent with 'motivated reasoning', where pre-existing beliefs and incentives bias how people process information and make inferences.

4.1.2 No urban–rural divide

Despite differences between farmers and the public in their understanding of effective climate actions, our second major finding is the general lack of urban–rural divide on climate change. Contrary to the assumption that climate change is a greater concern for urbanites, results show no significant differences between urban and rural residents in their knowledge, worry, willingness to take climate action, perception of others, or policy support. In fact, rural residents scored marginally higher in our measures of knowledge. These findings reinforce previous research indicating that the primary difference between urban and rural dwellers regarding climate action lies in the availability of infrastructure for sustainable transport, and not in attitudes, perceptions or willingness to change (Timmons et al., 2024; Andersson et al., 2024).

The distributions of responses show that most people favour climate action. Majorities across all groups expressed high (i.e. above the scale midpoint) worry about climate change (65% of urban dwellers, 59% of rural dwellers and 54% of farmers) and willingness to make climate-friendly lifestyle changes (59–66%), and they mostly supported climate policies (55–58%). Most farmers also reported considering the climate in their farming decisions (57%) and being willing to adopt climate-friendly farming practices (66%).

4.1.3 Climate 'resistance'

Although worry about climate change and willingness to support mitigation is high across all groups, our results show evidence of a small 'climate-resistant' subgroup. The distributions of multiple measures indicate a minority who depart from the mainstream view. For instance, a group exhibited low concern about climate change generally (11% of farmers, 7% of the rural public, and 8% of the urban public were 'not at all worried'), which matters because we find a strong link between whether someone is concerned about the climate and whether they are supportive of policy and willing to take action (this is also the case in the international literature, Bouman et al., 2020). An overlapping group reported lower willingness to engage in climate action by making lifestyle changes (4% of farmers, 6% of the rural public, and 4% of the urban public were 'very unlikely' to make changes) or adopting climate-friendly farming practices (7% of farmers did not consider the climate 'at all' in their decisions and 4% were 'very unlikely' to change how they farm for the climate). Only a small minority 'fully opposed' all climate policies (under 3% for all three groups). However, the proportion of participants who fully opposed specific policies varied substantially, ranging from under 3% (increasing home retrofit grants and helping farmers take up green technologies) to over 30% (meat tax, flight tax, reducing the national herd size). Thus, there is a small climate-resistant group, as well as a larger minority that generally accept pro-climate policies but oppose one or more specific policies. Importantly, the climate resistance that we record is dispersed across social groups and not linked to where people live or to being a farmer or non-farmer.

4.1.4 Misperceptions of farmers

We observe a disconnect between the public's perceptions of farmers and farmers' own views, which may feed into erroneous narratives of a divide between these groups. Farmers and the public did not significantly differ in their level of concern, willingness to take action, or overall policy support (though they differ on support for some specific policies). However, they misunderstood each other along several dimensions relevant to perceptions of climate resistance. Both the urban and rural public underestimated how worried farmers are about climate change, and how willing they were to take climate action, relative to how farmers judged themselves and their peers. Relatedly, almost half of farmers identified negative perceptions of farming as one of the top issues they face, while far fewer (~20%) of the public recognised this as an issue for farmers (although negative perceptions may relate to issues other than climate resistance, e.g. water pollution). Thus, there are multiple apparent misperceptions at play. Simple narratives that farmers are generally resistant to climate action, or that the public holds a negative view of farming in relation to climate change, are not accurate portrayals of the true situation, which is more subtle and varied.

While we lack evidence on the cause of this collective illusion, one possible explanation is that attention given to specific organisational disputes or protesting groups, and discussions of the Climate Action Plan using narrow and high-conflict language in some media (Byrne O'Morain and Robbins, 2024), skews perceptions of the broader farming community. The result is that many farmers may feel unfairly maligned as opposing climate action. This perception persists despite more farmers citing climate change as a top issue than issues like high workloads, labour shortages or succession. Farmers also report high willingness to adopt climate-friendly farming practices, with high awareness of measures such as agroforestry in particular.

4.2 POLICY IMPLICATIONS

Addressing these findings requires development of new policy actions to close knowledge gaps, correct misperceptions and leverage willingness for action.

The persistent deficit in factual knowledge about climate change, including on the large contribution of agriculture to emissions, has several implications. First, it is likely to undermine climate action, because accurate understanding of the situation is an important determinant of whether people cooperate in collective action problems (Martin, Timmons and Lunn, 2024). Individuals or groups, such as farmers, are unlikely to exert effort to reduce their carbon emissions without understanding which actions matter most or which sectors generate the most emissions. Second, knowing more basic facts about climate change is associated with stronger policy support; more accurate knowledge of sectoral contributors to emissions in particular is associated with stronger support for policies, including those that are more restrictive (and likely more effective). Third, knowledge gaps provide opportunity for biases in information processing and misinformation

(Ecker et al., 2022). Indeed, we observe evidence of potential motivated reasoning among beef and dairy farmers, which may lead to a resistance to scientific evidence on dietary emissions.

There is thus clear scope for government and other stakeholders to improve public and farmer engagement on facts about climate change. In particular, a clear statement from government about the link between diet and emissions is warranted. Ideally, this would be accompanied by credible and accessible information about dietary options for eating healthily and sustainably, which could be provided by the Department of Health (as advised by the Climate Change Advisory Council, 2024). As outlined in the opening chapter of this report, there are complexities involved in changing diets while ensuring good nutrition, but these ought not to be allowed to mask established relationships between meat eating, health and sustainability. Official acknowledgement of the environmental benefits, as well as the health benefits, of reducing meat intake to currently advised levels would be a start. This could be followed by the development of more comprehensive, evidence-based government guidelines for eating sustainably and healthily.

More generally, factual information about climate change may be most effective when delivered by trusted sources, such as scientists, the Environmental Protection Agency (EPA) and television weather reporters (O'Mahony et al., 2024). Encouragingly, even brief engagement with climate science boosts support for mitigative action (Timmons and Lunn, 2022). These communication efforts should not aim to reduce concern. Concern is reasonably high across urban, rural and farming communities and it correlates with support for climate action more strongly than knowledge does.

Stakeholders should also be mindful of misperceptions when designing communications and estimating support for policy. Our evidence shows that despite both farmers and the public holding very similar climate views, including high levels of concern and willingness to take action, the public appear to hold a collective illusion over farmer concern and willingness, which may also apply to those faced with decisions about policy implementation. It is thus important not to overestimate the prevalence of climate-resistant views, which remain a small minority among rural and farming populations as well as urban ones. When faced with vocal opposition to climate action or isolated disputes that attract media attention, effective communication might highlight that these views do not represent the majority. Pre-empting such narratives with communications on the near consensus about climate action or employing other strategies shown to effectively mitigate falsehoods may be more effective, though further evidence for the efficacy of these strategies in Ireland is required (e.g. Calabrese and Albarracín, 2023; Lewandowsky et al., 2012; van der Linden, 2022).

Correcting and preventing collective illusions about resistance to climate action is critical for the kind of policy implementation and voluntary behaviour change required to meet emissions reductions targets. Another important factor

determining cooperation in collective action problems is the belief that others will cooperate too (Martin, Timmons and Lunn, 2024). The public's misperception that farmers are less concerned about climate change may undermine the cooperation needed to meet emissions targets. This could hinder climate action both in agriculture, by maligning farmers, and in other domains, by demotivating the public; why should they put effort into changing their behaviour when the country's largest emitters seem unlikely to do so? It is thus important to challenge narratives that seek to exploit the existence of climate-resistant views to create a false sense of division. Instead, emphasising shared concerns, values and identities across groups can foster collaboration and may too help reduce farmers' sense of marginalisation. For additional strategies to enhance cooperation in collective action problems, see Martin, Timmons and Lunn (2024).

Among farmers specifically, there is clear potential to leverage their willingness to engage in climate action. Almost half identify climate change as a top concern and most state a willingness to adopt climate-friendly farming practices, while reporting high awareness of practices in areas such as agroforestry and green technology uptake. The limited implementation of such practices invites further investigation. Exercises like the EPA-funded behavioural audit of afforestation schemes, which maps the systemic and behavioural factors that may hamper the take-up of such schemes at each stage of the afforestation licensing process, may be particularly helpful at improving implementation (Lentz et al., 2024), while helping address the financial issues and regulatory and compliance burdens frequently cited by farmers. Furthermore, farmers had relatively low awareness of some of the most cost-effective climate-friendly farming practices, such as protected urea fertilisers and biomethane (Teagasc, 2023). This suggests an opportunity for further communication efforts on 'easy wins' for farmers that can substantially cut their emissions while saving them money (for example, as part of the Teagasc Signpost Programme).

4.3 LIMITATIONS

These implications should be considered with some survey limitations in mind. One potential concern with surveys about topics like climate change is social desirability bias, where some participants may provide responses they expect to be perceived positively rather than answering honestly. Social desirability bias is unlikely to significantly alter our conclusions, as the survey was fielded anonymously and online to the public sample and many of the farmers (Ó Ceallaigh et al., 2023). Moreover, robustness checks confirmed consistent responses between farmers who completed the survey in person (where social desirability is likely strongest) and those who participated online. Notably, this concern does not arise with knowledge questions, which had objective, incentivised responses.

Second, we undertook several steps to minimise sample selection bias, whereby those who opt to complete surveys may differ from those who do not. While this concern applies to all surveys, including random probability samples, it can be

mitigated. To reduce bias towards participants with strong climate views (in either direction), we 'badged' the survey as addressing the future of farming rather than climate change. The descriptive data described in this report are weighted to reflect the characteristics of Ireland's farming population and our statistical models include appropriate socio-demographic controls. Further, robustness checks that disaggregated results across various groups of farmers (based on their production focus, farm size, years of experience, etc.) generally confirm that no particular group drove the findings (except where otherwise noted, e.g. on beef and dairy farmers' knowledge of the impact of eating plant-based diets).

4.4 CONCLUSION

The complexity of a coordinated reduction of GHG emissions is difficult to understate. Although there are multiple benefits to climate action, including cleaner air and better public health, the necessary changes entail disruption to the status quo. Understanding and deploying evidence from behavioural science on how to encourage different groups to make these sorts of changes can help, particularly in sectors where efforts are voluntary, rather than mandated or strongly incentivised, as is currently the case in Ireland's agricultural sector. Our evidence suggests that there remains considerable scope for improving understanding of which actions are most effective at reducing emissions. Fortunately, attitudes about the importance of this action are positive. For farmers specifically, the results also point to substantial potential to assist them in taking the kind of climate action they are already willing to take, while improving their understanding of the most effective actions. This may have further benefits for cooperation, if these efforts are communicated effectively to the wider public to correct misperceptions of farmers. Retaining concern about climate change and positive attitudes towards climate action to foster cooperation may require active efforts to resist attempts at manufacturing division between subgroups in society or at amplifying the small 'climate-resistant' minority.

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