DRAFT MANUSCRIPT

Public support for food subsidy and tax scenarios to improve the accessibility of healthy and sustainable food: Evidence from deliberative forums in two UK cities, 2023

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Abstract

The UK government could use policies relating to their expenditure (subsidies) and revenue (taxes) to make healthy, environmentally sustainable food more accessible, in attempts to prevent worsened public health and environmental outcomes of the food system. As food subsidies and taxes are often contested, deliberative methods are useful for converging debate to policy decisions supported by the public. We held two, 2-day long deliberative forums with 24 members of the UK public, to see which food subsidy or tax scenarios they would prefer the government to implement. Though there were substantial differences in the specific policy preferences of each forum, overall participants favoured the implementation of a population-wide tax on high carbon foods.

Introduction

As food systems are responsible for a third of greenhouse gas emissions [1], and diet-related ill-health is the leading cause of death globally [2], urgent action is required to develop healthier and environmentally sustainable food systems. In the UK, food cost is a major driver of food choice: healthier foods (e.g., fruit and vegetables) are over twice as expensive per calorie as less healthy foods (e.g., those high in fat, salt and/or sugar) [3]. Food prices have risen at the fastest pace for over 40 years, with the annual rate of UK food and non-alcoholic beverage inflation increasing to 19.1% between April 2022 and March 2023 [4]. As enforced measures (e.g. policies enforced by government) tend to achieve greater outcomes than voluntary measures [5], and as interventions requiring minimal personal resource are more likely to be effective and equitable [6], the UK government could use policies that change food prices to prevent worsened health and environmental outcomes.

"Fiscal policies" are key mechanisms through which governments influence product price, primarily by manipulating government expenditure (subsidies) and revenue (taxes). Globally, over 110 food subsidy or taxes already exist explicitly to improve the healthiness of food [7]. Beyond affecting product price, the announcement and implementation of a fiscal policy can instigate other systemic changes that have consequences for food healthiness and sustainability, including changes to product marketing, market structure, political acceptability of further measures, and sales of tax-exempt foods [8]. The UK government has precedent for implementing fiscal policies to improve diet-related health (e.g., UK Soft Drinks Industry Levy) [9], and further have been proposed (e.g. expansion of the Levy to less healthy foods) [10].

Sufficient public support for policies is important for grounding policymaking in democratic values, and for creating an environment conducive to implementation and enforcement [11]. There was UK public support for existing taxes around their time of implementation (68% - 70% support in 2017 – 2019 for the Soft Drinks Industry Levy) [12], and for potential future food taxes and regulations affecting food companies [13]. The findings have been replicated for health-related fiscal policies in some (e.g., South Korea [14]), but not all (e.g., New Zealand [15], other settings. Nonetheless, differing perspective across the food system often slows the implementation of these and other policies affecting public health or climate change [11]. For example, whether and how the state should intervene in individuals' food practices (often on the grounds of individualist discourse e.g., personal choice and responsibility), fairness, and whether the state's actions are trusted or of legitimate interest are often debated [16], [17]. Implementation is further complicated by the commercial food industry, who are known to oppose policies that could restrict their profitability (e.g., marketing restrictions) with tactics to influence public debate such as media campaigns, undermining underpinning sciences [18], and discrediting measures on the grounds of "paternalism" [19].

Policymakers are increasingly using deliberative methods (e.g. citizens' juries, assemblies etc.) to support policymaking [11], as they allow integration of citizens' views into democratic decision making and are particularly suited to complex, divisive problems [20], [21]. The provision of evidence is a distinguishing feature of deliberative methods, potentially leading to greater public support for policies – since support is influenced by the extent that policy impacts are communicated [22] – and leads to a more valid measure of public values [11], [23]. Through evidence-informed debate of opposing views, deliberative methods have the ultimate aim of creating a legitimate group decision [21], [24]. Whereas methods that aggregate individual opinions (e.g., surveys, polls) risk presenting self-interested views that reflect ignorance about a topic [25], deliberation encourages consideration of the interdependence between the individual and broader societal consequences of decisions [23], which is particularly well suited to food system governance decision making [26]. Evidence also shows that deliberative methods create momentum around climate action [20]. Various food policies have been the subject of

deliberation [27], [28], [29],[30], [31] including in the UK recently [10], and such methods have substantial scope to complement the work of existing democratic institutions [32][26].

In this study, we used a deliberative method called deliberative forums (DFs) to understand UK public preferences for food subsidy and tax policy scenarios that could make healthy, sustainable food more accessible. These DFs were integrated in a wider programme of work called the CO-designing for healthy People and Planet: food Economic policy Research (COPPER) project (see **Box 1**), which seeks to co-design food subsidy and tax scenarios with the public and policymakers.

Box 1 Summary of the CO-designing for healthy People and Planet: food Economic policy Research (COPPER) project

CO-designing for healthy People and Planet: food Economic policy Research (COPPER)

COPPER is a research project involving researchers from the Universities of Oxford, Reading, Exeter and London School of Hygiene and Tropical Medicine, working in partnership with the Food Foundation, a charity working to ensure healthy diets are affordable and accessible. The research is divided across three work packages:

Work package 1: engages the public and policymakers to co-design food subsidy and tax scenarios. We first collected evidence of existing or proposed food subsidies and taxes using a systematic scoping review, to produce a list of policy scenarios. Then, the public's views about different policy attributes were tested in an online public survey and discrete choice experiment. Both the policy scenarios and evidence about public views were used in DFs. Two, 2-day DFs took place in October 2023; one in Glasgow and one in Bridlington. By the end of each DF, participants worked together to rank their preferred scenarios, and we aggregated the rankings from each DF to produce an overall ranking. To inform the modelling in Work Package 2, we will work with our Policy Review Board, which consists of a range of UK civil servants and policymakers, to specify the policies. After the modelling in Work Package 2, we will ask for feedback from DF participants in online focus groups.

Work package 2: For the prioritised scenarios, microeconomic econometrical modelling will model changes in household-level expenditure, nutritional quality of diet and changes in sales of food and drinks products. Macroeconomic modelling will model the impact on Gross Domestic Product, tax revenue, employment and income inequalities.

Work package 3: We will model the impacts on population health (e.g. change in population BMI, Quality Adjusted Life Years, life expectancy) and the environment (e.g., greenhouse gas emissions, land use, water use, water pollution).

Full protocol available via NIHR: https://fundingawards.nihr.ac.uk/award/NIHR133887

Methods

We held two DFs, first in Govanhill, Glasgow (hereafter "Glasgow") and then in Bridlington, UK, in October 2023. These locations were selected for having different policy and demographic contexts. The DFs drew on principles from deliberative focus groups, as we were interested in eliciting views from under-represented groups more so than from a nationally representative sample; and from citizens' juries, as we followed a process of evidence presentation and interrogation to support participants reaching a policy decision [33]. Each DF lasted for 2 days, and participants used evidence and deliberation to arrive at a collective ranking for the food subsidy and taxation policy scenarios they consider best able to improve the accessibility of healthy, sustainable food. We aggregated the results of each DF to produce an overall policy scenario ranking.

Developing food subsidy and tax scenarios

We conducted a scoping review to identify existing or proposed taxes or subsidies that aim to improve the health or environmental impact of food, the results of which will be reported elsewhere. We used R software to identify duplicate policies, within both country and attribute (e.g. target food or population). These were further refined by the COPPER team to produce 8 subsidy and 8 taxation policy scenarios, details of which are included in **Table 2.** Each participant was issued a policy flashcard deck in their participant pack at the start of the DF (see **Appendix 1**). The flashcards included graphic images, example foods, and information about who has implemented or proposed each policy scenario. The flashcard deck also included the option for participants to develop "a new food related tax or subsidy", or rank "no new food related tax" or "no new food related subsidy". Policy 9 was included as a "wild card": an intentionally extreme or infeasible policy to encourage reflection on implicit assumptions and overcome established mind-sets [34].

Table 2 Summary of food subsidy and taxation policy scenarios that participants deliberated

Policy number	Subsidy or tax	Target food	Target population
1	Tax	Snack foods	Population
2	Tax	Foods that are high in fat, sugar or salt and low in fibre, minerals and vitamins	Population
3	Tax	Red meat and processed red meat (any red meat that is cured, salted, smoked etc.)	Population
4	Tax	Foods high in sugar	Population
5	Tax	Foods high in saturated fat	Population
6	Tax	Foods high in calories	Population
7	Tax	Foods high in salt	Population
8	Tax	High carbon foods	Population
9	Subsidy	Free fruit and vegetables	Population
10	Subsidy	Fruits and vegetables	Households living in low income
11	Subsidy	Fresh and frozen meat; fresh, frozen and canned fish	Population

Policy number	Subsidy or tax	Target food	Target population
12	Subsidy	Fresh and frozen meat; fresh, frozen and canned fish	Households living in low income
13	Subsidy	Any food that has a healthy nutritional profile	Population
14	Subsidy	Any food that has a healthy nutritional profile	Households living in low income
15	Subsidy	Any food	Households living in low income
16	Subsidy	Low carbon foods	Population

Pilot

In April 2023, we held a pilot DF with 5 members of the public known to the Food Foundation. Each participant was remunerated at the rate of living wage (£75). The pilot was a condensed version of the DF, lasting for one instead of two days, in which key elements of the DF were trialled e.g., warm-up activities, deliberation. Key changes were made to the DF agenda following the pilot to improve participants' experiences, including: introducing the project and its aims more thoroughly, dividing participants into small groups to discuss the evidence presented, and making policy presentation more accessible via flashcards. We sent participants a summary of the changes made.

Recruitment

Our recruitment strategy was informed by team member's planning visits to Glasgow (HF) and Bridlington (PS) in November 2022. In each visit, HF and PS met with key partner organisations – Govanhill Community Bath Trust in Glasgow and Bridlington Community Hub in Bridlington, respectively – to plan recruitment (e.g., local organisations to distribute recruitment flyers, context of local community) and identify locations to host the DFs (e.g., check facilities, layout of space).

From these visits, we learned that some people in the local communities may not speak or read English as a first language, may not be digitally literate or have access to the internet, and may have financial barriers or child caring responsibilities that prevent participation. In response, we: (i) translated recruitment posters and provisioned to translate DF materials to other languages than English and produced a video version of the participant information sheet; (ii) provided opportunities for participants to register for the project without the internet (e.g., completing the online registration/consent forms over the phone); (ii) remunerated participants at the rate of minimum wage for their involvement as (£150 per person) and pay travel expenses; and (iii) held the DFs on weekdays and within school hours (9:15am – 3:15pm).

We aimed to recruit 12-15 participants for each DF, since this is considered a manageable number of participants and avoids the resource demands of a larger group [25]. Had we had more registrations that our desired sample size, we planned to consent up to 17 participants for each DF so that we could still attain our desired sample size in case of drop-out. To be eligible for inclusion, participants had to be

aged 18 and over, resident in the UK, and have sufficient proficiency in spoken English to enable discussion. Initially, we intended for participants to live within approximately 10 miles of each DF location. However, when recruitment was slower than intended we were more flexible with this requirement to ensure sufficient sample size (still living within the same city). We were particularly keen to involve participants less likely to have a voice in policymaking, which we defined as having one of the following characteristics: from a low-income household, non-white ethnicity, and single parent households. Had we been oversubscribed, we would have prioritised involving these individuals.

We recruited participants by emailing information about our study (text for insertion in emails, recruitment poster, and recruitment image for social media) to local organisations (e.g., special interest groups, volunteer groups, religious organisations) and asking them to share it with their email lists, social media accounts, or equivalent. Information included a summary of the project and DF, eligibility requirements, and details for interested people to contact HF by phone or email. Our local partner organisations also distributed paper copies of posters to relevant notice boards; and in Glasgow this included posters translated into popular local languages, Arabic and Urdu.

Those contacting HF were sent the participant information sheet, the link to the participant information video hosted on the University of Oxford's Nuffield Department of Primary Care Health Science's YouTube channel, the privacy notice, a link to the COPPER website, and a link to an online registration form hosted by Microsoft Forms. The registration form first checked if the interested person fulfilled the eligibility criteria: to avoid unnecessary data collection, those that did not meet the eligibility criteria had to exit the form. The rest of the form collected basic demographic information about participants (age, gender, ethnicity, family income, number of children in household, whether a single parent), access requirements as recommended elsewhere (e.g. difficulty hearing or reading printed information etc.) [35], practical considerations (e.g. dietary requirements, access to prayer room etc.), contact information, and consent to be contacted if selected. Those registering were also asked to share information about the study with their contacts, to permit snowball recruitment.

Everyone who registered was offered a short phone call with a team member (HF) before consenting, to build rapport, remind potential participants what the study entailed, and to give opportunity to ask remaining questions. HF also used the calls to informally gauge whether there might be difficulty participating in spoken English. After the call, potential participants were sent an email confirming their selection for the DF and containing final practical information about attending (e.g., location, arrival times, travel options), and a link to the online consent form hosted in Microsoft Forms. Those completing the form were formally admitted to the study and were sent a PDF copy of their completed consent form. To mitigate drop-out, participants were sent a reminder email the day before each DF.

Deliberative forums

Upon advice from those performing similar studies [17], we rented public meeting spaces to host the DFs (the Wee Retreat CIC in Glasgow, and Bridlington Community Hub in Bridlington), to make all participants feel comfortable attending. In total, 6 members of the team facilitated the DF in Glasgow (AC, HF, JR, PS, MS, LY) and 5 in Bridlington (AC, HF, JR, PS, LY). Team members adopted recommended specific roles [17]: moderator (e.g., time keeping, introducing activities, operating recorders; HF), expert advisor (e.g., responding to questions about evidence videos; PS), protagonist (e.g., to provoke debate; MS, PS), facilitators (e.g., for small groups and activities; AC, JR, LY). The facilitation team held preparatory and de-brief sessions for each DF to support the team's wellbeing.

Upon arrival, participants were registered, asked if they had any additional requirements, and given participant packs that contained a participant agenda, 2 attitude forms, 2 evaluation forms, a policy flashcard deck, and the participant information sheet. We used local catering companies to provide a vegetarian lunch and refreshments on each day of the DFs and catered to specific diets upon request.

We used experience from the pilot to inform the DF agenda, and made adaptations to the agenda for the Bridlington forum after learning from Glasgow (see **Appendix 2**). Both DFs consisted of key elements of deliberative events: setting the policy problem, evidence provision, and deliberation.

Setting the policy problem

After introducing the project and team, and completing warm-up activities, we introduced the policy problem: "What food subsidy or tax policies should the UK government use to make healthy and sustainable food more affordable/accessible?". Participants were told that by the end of the DF, they must work together to produce a group ranking of their preferred policy scenarios. The group was issued 100 counters ("points") that they could use to demonstrate priority: –the greater the number of counters/points assigned to a policy, the higher the priority. There were no limits on how participants allocated the counters (e.g., not use any counters, all counters on one policy, etc.). The policy problem wording was included on the participant agenda and on a poster on the wall to remind participants. We also made clear the policy relevance of the DF, explaining how we would present the ranked policies to the Policy Review Board who have a direct contact with relevant policy discussions.

Evidence provision

We invited 5 known experts in topics relevant to the policy problem to produce evidence videos: policymaking (Professor Mike Rayner, University of Oxford), environment (Professor Rosemary Green, London School of Hygiene and Tropical Medicine), health (Dr Keren Papier, University of Oxford), economics (Professor Emma Frew, University of Birmingham), and public views (Dr John Buckell, University of Oxford; drawing on results of the discrete choice experiment from earlier in COPPER, see **Box 1**). Though we did not prescribe what each video should include, we provided each expert with briefing information: each video should last 7-10 minutes and include 'take home' messages

at the end. After playing each video in the DFs, we split participants into small groups to allow for discussion and ask questions of the expert about the evidence.

Deliberation

To maximise opportunity for all participants to contribute to policy ranking, participants were divided into 3 small groups with a facilitator for deliberation, before reconvening to full group, facilitated deliberation. In small group deliberation, participants were able to comprehensively read and understand the content of each policy flashcard, and were tasked with (i) producing an initial ranking of the policies, (ii) providing reasons for this ranking, and (iii) reporting how this ranking was produced. In the full group deliberation, each small group shared (i) - (iii), and the protagonist looked for similarities and difference in each group's ranking to initiate discussion leading to a full group decision. Policy flashcards and post-it notes were used to visualise and facilitate the grouping and ranking of different policies.

Data collection

The primary data collected was the policy scenario ranking in each DF, which was recorded by photographing the ranked policy flashcards and number of counters on each flashcard. Small group and full group deliberation was audio recorded, transcribed verbatim, and thematically analysed to explore reasons for the policy rankings. To understand participants' experience of the DF, participants anonymously completed paper attitude forms at the beginning and end of each DF about related topics (e.g., climate change, government policy, public health), and paper evaluation forms at the end of day one and day two of each DF. At the start of day two, we updated the group about how we dealt with their comments in the day one evaluation forms. Results of these forms and the audio recordings are omitted from this paper for brevity.

Analysis

As the Glasgow forum only used 86 of their 100 available points, we weighted the allocated points to total 100 so that they had equal contribution to the overall ranking as the Bridlington forum. The weighted rankings scores of Glasgow and the unweighted ranking scores of Bridlington were aggregated to produce a singular, overall policy ranking.

Ethics

We received a favourable review of our study by the University of Oxford's Central University Research Ethics Committee (CUREC) on 11th July 2023 (reference R85156/RE002).

Results

Participant characteristics

In total, 24 people participated in the DFs (see **Table 3**). With the help of our partner organisations, we share recruitment information with a total of 56 local organisations in Glasgow and 27 in Bridlington.

In response, 45 people contacted us with interest in the study (Glasgow: 27; Bridlington: 17). Of the 15 people registering to participate in Glasgow, 13 ultimately participated; all of the 11 people registered for Bridlington ultimately participated. Everyone who wanted to participate was able to (i.e., we did not select people based on specific characteristics). One person withdrew from the study after consenting to participate in the Glasgow forum before it started. All participants attended all sections of the DF in Bridlington. In Glasgow, one participant was absent for the second half of day 1, which meant they initially missed 3 evidence videos (environment, health, and economics) and did not complete the end of day 1 evaluation form. On day 2, we played them some (environment, health) but not all (economics) of the videos they missed during breaks. A different participant in Glasgow left at 2pm on the day 2, meaning they did not contribute to the final group deliberation session.

Table 3 Summary of recruitment for each deliberative forum (organisations contacted for recruitment, number of people expressing interest, registering, consenting, and withdrawing after consent)

Deliberative forum location	Number of organisations contacted	Number of people expressing interest	Number of people registering	Number of people consenting	Number of people withdrawing after consent	Total participants
Glasgow	56	27	15	14	1	13
Bridlington	27	17	11	11	0	11
Total	**83**	**45**	**26**	**25**	**1**	**24**

Table 4 summarises participants' characteristics in each DF and overall. More people from younger age groups attended the Glasgow DF than the Bridlington DF: 93% (n=12) of participants in Glasgow were aged 64 years or younger, whereas 82% (n=9) of participants in Bridlington were aged 65 years or older. The majority of DF participants identified as female (75%, n=18), but more so in Glasgow (85%, n=11) than in Bridlington (64%, n=7). Most participants identified as white (n=21), and only one participant had children and was a single parent (n=1, 4%). Participants in Glasgow had a range of family incomes, though most in Bridlington had a family income of £20,000 - £29,999 (64%, n=7).

Table 4 Deliberative forum participant characteristics

		Glasgow		Bridlington		Combined	
Characteristic		n	%	n	%	n	%
Age	18 – 24 years	0	0	0	0	0	0%
	25 – 34 years	4	31%	0	0	4	17%
	35 – 44 years	3	23%	0	0	3	13%
	45 – 54 years	1	8%	0	0	1	4%
	55 – 64 years	4	31%	2	18%	6	25%
	65 years or over	1	8%	9	82%	10	42%

Characteristic		Glasgow		Bridlington		Combined	
		n	%	n	%	n	%
	Total	13		11		24	
Gender	Male	1	8%	4	36%	5	21%
	Female	11	85%	7	64%	18	75%
	Non-binary	1	8%	0	0%	1	4%
	Total	13		11		24	
Ethnicity*	Black, Black British, Caribbean or African	1	n/a	0	n/a	1	n/a
	Mixed or multiple ethnic groups	1	n/a	0	n/a	1	n/a
	Other ethnic group	1	n/a	0	n/a	1	n/a
	White	10	n/a	11	n/a	21	n/a
	Prefer not to say	1	n/a	0	n/a	1	n/a
Family income	Less than £10,000	1	8%	1	9%	2	8%
	£10,000 - £19,999	2	15%	0	0%	2	8%
	£20,000 - £29,999	2	15%	7	64%	9	38%
	£30,000 - £39,999	1	8%	1	9%	2	8%
	£40,000 - £49,999	0	0%	1	9%	1	4%
	£50,000 and above	3	23%	1	9%	4	17%
	I do not know	2	15%	0	0%	2	8%
	I prefer not to say	2	15%	0	0%	2	8%
	Total	13		11		24	
Children in household	2 children - single parent	1	8%	0	0%	1	4%
	No children	12	92%	11	100%	23	96%
	Total	13		11		24	

Notes: * Participants could select multiple ethnicity categories

Policy scenario ranking

Table 5 shows the results of the policy scenario ranking. Overall, the highest-ranking policy scenario was a population-wide tax on high carbon foods (42.9 points), though this was not the top ranked scenario for either location. Glasgow's preferred scenario was a population-wide subsidy for fruit and vegetables that are ethically sourced (34.88). Bridlington's preferred policy scenario was a population-wide tax on foods that are high in fat, sugar, or salt and low in fibre, minerals and vitamins combined with a population-wide subsidy for any food that has a healthy nutritional profile (40 points). Only Bridlington devised a new policy, which was a population-wide subsidy on local foods (15 points). In general, tax scenarios were ranked more highly than those for subsidies, though more subsidy scenarios than tax scenarios were allocated points. Participants preferred population-wide policies to policies that targeted people experiencing low income.

265 **Table 5 Policy scenario ranking results from the deliberative forums in Glasgow and Bridlington**

Policy #	Subsidy /tax	Target food	Target population	Bridlington ranking	Bridlington notes	Glasgow ranking	Glasgow scaled	Glasgow notes	Combined scaled	Who ranked?
8	Tax	High carbon foods	Population	15		24	27.91		**42.9**	BOTH
2	Tax	Foods that are high in fat, sugar, or salt and low in fibre, minerals and vitamins	Population	40	Combined with 13	n/a	n/a		**40**	BRID
9	Subsidy	Free fruits and vegetables	Population	n/a		30	34.88	Not fully free; ethically sourced	**34.9**	GLAS
16	Subsidy	Low carbon foods	Population	n/a		26	30.23		**30.2**	GLAS
3	Tax	Red meat and processed red meat	Population	20	Combined with 11	n/a	n/a		**20**	BRID
NEW	Subsidy	Local food subsidy	Population	15		n/a	n/a		**15**	BRID
10	Subsidy	Free fruits and vegetables	Low income	10		n/a	n/a		**10**	BRID
13	Subsidy	Any food that has a healthy nutritional profile	Population	*	Combined with 2	2	2.33		**2.33**	BOTH
14	Subsidy	Any food that has a healthy nutritional profile	Low income	n/a		2	2.33		**2.33**	GLAS
15	Subsidy	Any food	Low income	n/a		2	2.33		**2.33**	GLAS
11	Subsidy	Fresh and frozen meat; fresh, frozen and canned fish	Population	*	Combined with 3	n/a	n/a		**n/a**	BRID

266 Notes n/a: not applicable, used when the policy was ranked by the other forum; *: a combined policy so points represented elsewhere.

Discussion

Summary of findings

We held two DFs in Glasgow and in Bridlington with 24 members of the public, where we asked participants to deliberate evidence about the food system to decide which food subsidy or tax scenarios would be best able to make healthy and sustainable food more accessible. Overall, participants preferred a population-wide tax on high carbon foods (allocated 42.9 points). However, the preferred scenario in Glasgow was a population-wide subsidy for fruit and vegetables that are ethically sourced (34.88 points), and Bridlington's preferred scenario was a population-wide tax on foods that are high in fat, sugar, or salt and low in fibre, minerals and vitamins combined with a population-wide subsidy for any food that has a healthy nutritional profile (40 points). In general, taxes were ranked more highly than subsidies, though more subsidy scenarios than tax scenarios were allocated any points. Participants preferred population-wide policies to policies that targeted people experiencing low income.

Strengths and limitations

Our research explicitly intended to involve those under-represented in policy discourse, which could help policymakers develop policies supported by, and relevant to, the populations they seek to help. We used a range of techniques to encourage participation from local communities, including videos instead of written materials, sufficient remuneration, and timing the forums during school hours. We also mitigated participant drop-out by building rapport with participants prior to the event by email and phone calls, providing various opportunities for participants to ask question and fully understand the demands of the research, and creating a welcoming environment at the DFs (e.g. warm-up sessions).

The results inevitably reflect the specific design of our DFs. We involved a range of world-leading experts in the DFs through the evidence videos, so that participants' debate was informed by accurate, relevant knowledge on topics selected by the research team. However, practical limits to the duration of the DF meant we could not involve all possibly relevant evidence, nor the range of views on each topic that could be relevant. We also prioritised the provision of academic evidence, but policy decisions are often informed by a broader spectrum of evidence [36]. Longer DFs, involving a broader spectrum of evidence from diverse sources may have returned a different policy scenario ranking.

Facilitators and participants observed power imbalances within the group of participants in each DF, despite the inherent attempts of consensus methods [37], and specifically deliberative methods [38], to achieve otherwise. These arose from both differences in prior knowledge on the topic and in confidence to put forward opinions during the DF. Imbalances risk the integrity of DF's outcomes by encouraging the results to adhere to an individual or small number of participant's opinion(s), rather than converge to a mutually-agreeable outcome. Some participants leaving early or missing sections may have compounded power dynamics in Glasgow. We tried to mitigate power imbalances using facilitation techniques that encourage equal contribution (e.g., introduction and reminder of ground rules, eliciting

round-robin contributions in group activities). By solely providing evidence during the DFs, rather than as preparation beforehand, we also attempted to minimise opportunity for those participants with greater agency to prepare (e.g. time, access to computer) to wield more power in the DF.

Comparison to existing literature

Our study is the first we are aware of that applies deliberative methods to identify fiscal policy solutions to address the human and environmental consequences of the UK food system. Much of the existing literature that applies deliberative methods to food policies has been conducted in Australia [30][29],[27], [28] and has found similar support for taxes on less healthy foods [28], [29], adding to the credibility of our findings here. Prior applications of deliberative methods to food issues have tended to focus on solutions to either health or environmental outcomes, even though they are the product of the same food system [10]. Finding policy solutions that concurrently deal with both, and that are specific to the UK policy context, could lead to more efficient policymaking with greater potential to initiate systemic changes.

There is a precedent for using deliberative methods in the context of public spending: the field of participatory (or civic) budgeting (PB) empowers citizens to choose how at least a portion of public budget is spent [39], [40], and can enhance both transparency and democratic accountability [41]. Brazil introduced the first PB in the 1980s, and though PB has been widely implemented since [42], there has been limited adoption in the UK [41]. To achieve its full potential, PB should be presented as an essential democratic process [41], involving a real transfer of power and resource [43]. This corresponds with our experience in the DFs, where we found participants were most engaged with the project when we emphasised the resultant contribution the DFs would have to real-world policy decision making. By conducting a form of PB research in the UK and by focusing on national rather than the usual city-wide or regional budgetary decisions, we extend previous the PB evidence base.

Interpretation and implications

The policy scenarios prioritised in the two DFs reflect the context in which we conducted the research and the specific participants involved. Despite the range of recruitment techniques we deployed, fewer people experiencing low income, from an ethnic minority, or experiencing single-parenthood, participated than we had hoped would. It is possible that there was self-selection bias in our sample of participants; particularly as environmental-focused community-based research often disproportionately attract and involve white and/or middle- and upper-class populations [44]. Such bias risks misrepresenting the views of the ‘communities’ such activities seek to serve, and as the results of these activities tend to prioritise apolitical/behavioural solutions to environmental issues, they can develop a feedback cycle of who is involved and what is achieved [44]. An important part of COPPER will involve working with public engagement specialists (LY) to develop a legacy in the communities that the DFs

were held, in the hopes this will encourage participants we involved to be inspired by future participatory action, as much as the topic we focused on in the DFs.

Conducting this research against the backdrop of exceptionally high food prices may have encourage the ranking of more subsidy than tax scenarios [4]. However, as we have presented our results as a singular scenario ranking, they are less able to reflect the disagreements, compromises, and spectrum of views that constitutes the points allocated to each scenario. Furthermore, that several tax scenarios were ranked very highly – and more so than subsidies – despite this context suggests that the UK public are supportive of transforming the UK food system with measures discourage rather than incentivise certain behaviours. This directly contrasts with political and industry discourse that states otherwise.

Without pathways to policy implementation, there is a risk that participatory work such as ours can perpetuate cycles of civic disengagement [42]. In COPPER, we are undertaking specific work to encourage policy uptake. This includes working with a Policy Review Board to specify sufficiently the policies in our next stage of work that would permit future implementation, and since the Board have a direct line to policymakers tasked with implementing such policies. We are also working with the Food Foundation who are experts in feeding academic research into policy debate, and disseminating our findings wildly (e.g. policy briefings).

Conclusion

Our DFs held with 24 participants in Glasgow and Bridlington found that the UK public support the implementation of a range of food subsidy and tax scenarios that could help make healthy, sustainable food more accessible. Though each DF differed in their ranking of policy scenarios, overall participants favoured the implementation of a population-wide tax on high carbon foods (allocated 42.9 points), ranked taxes more highly than subsidies, ranked more subsidy scenarios than tax scenarios, and preferred population-wide policies to policies that targeted people experiencing low income.

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List of supplementary materials

Appendix 1: Policy flashcards

Appendix 2: Deliberative forum agenda

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