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ORIGINAL ARTICLE

Expert consensus for regulating 'meal deal' price promotions in supermarkets: A policy Delphi study in Wales, UK

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Abstract

Aim Supermarket meal deals offer bundles of items at a discounted price for lunch and dinner, typically including a main meal, drink and other add-on items that are often high in fat, sugar and salt (HFSS). This policy Delphi study aimed to assess expert consensus for regulating supermarket meal deals and to consolidate recommendations for legislative approaches.

Subject and methods A total of 44 stakeholders with diet, nutrition and obesity-related expertise participated across four consultation rounds. First, three iterations of an online survey explored varying nutritional thresholds and reference guidelines for a nutrient profile (NP) model to regulate item eligibility for promotion. Second, an online panel meeting was used to confirm agreement with policy recommendations including a final vote. Consensus was reached where 70% of stakeholders 'unanimously' agreed or disagreed with proposed items in each round.

Results For lunch and dinner, mandating an upper limit for the proportion of daily nutrients (energy/kcal, total fat, sugars, salt) provided by a purchased meal, and including minimum fruit or vegetable portions, achieved the strongest consensus (reaching > 90%). Stakeholders identified 30% as the most appropriate proportional limit for lunch (reaching 71%), and consensus indicated that this should be set below 50% of the recommended daily intake for dinner (reaching 71%). Final models proposed a focus on the nutrients to be consumed, rather than excluding specific food groups.

Conclusion Policy regulations to inform industry standards should consider the nutritional content of promoted meals in their totality, to better account for the effects of intended portion size on daily intake.

Keywords Meal deal · Supermarket food promotion · Overweight · Obesity · Obesogenic environment

Key messages

• Supermarket meal deals typically promote items that are high in fat, sugar and salt (HFSS), increasing the total energy (kcal) per serving and risk of overconsumption.

- Rather than exclude specific food categories, regulations should encourage the provision and uptake of healthy and acceptable bundles for consumers.
- The total meal offered (i.e. main item, drink and add-on items) should not exceed 30% of the daily reference intake for specified nutrients (energy/kcal, total fat, sugars and salt) for lunch, and should not exceed 40% for dinner, including at least one serving of fruits and vegetables per bundle.
- As new policies are introduced to support healthy food environments, this study highlights an opportunity to inform industry standards on the nutritional content of meals from a public health perspective.

Extended author information available on the last page of the article

Introduction

Poor diet quality is widely recognised as a key driver of both undernutrition and obesity globally (Swinburn et al. 2019; Afshin et al. 2019). As part of systems approaches to understanding causality, several models have highlighted the complex number of factors and interrelationships that influence diet, physical activity and obesity (Finegood et al. 2010; Lee et al. 2017; Bagnall et al. 2019). Though this includes biological (e.g. genetic and physiological predisposition) and individual psychosocial (e.g. food preferences, stress, personal relationships) factors, interventions to improve population nutrition often focus on tackling potential levers in the 'obesogenic' food environment (Kirk et al. 2010; Townshend and Lake 2017; Papagiannaki and Kerr 2024). Alongside larger portions (Nielsen and Popkin 2003, 2004; Papagiannaki and Kerr 2024), greater access to a convenient and varied supply of energy-dense foods has been associated with increased energy intake (Rolls 2009;

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Johnson and Wardle 2014; Embling et al. 2021). This access can be disproportionate: those living in deprived areas are more likely to be exposed to a higher density of fast-food and takeaway outlets, which in turn has been associated with elevated body mass index (BMI) and greater odds of obesity (Burgoine et al. 2018). Supermarket access to healthy foods (such as fresh produce) can have protective neighbourhood effects against obesity; however, evidence can be inconsistent, where supermarkets also provide access to unhealthy and poor-quality food (Zhou et al. 2021; Vilar-Compte et al. 2021).

At a local level, supermarkets can influence product availability and consumer behaviour at the point of purchase (Adam and Jensen 2016; Golding et al. 2022). As a key marketing strategy to increase food sales (Hawkes 2009), price promotions include temporary price reductions (e.g. 50% off) as well as volume-based or multiple-unit deals (e.g. buy-one-get-one-free). These promotions often apply to more than a third of items within high fat, sugar and salt (HFSS) food categories such as pizza, ice cream, crisps and biscuits (Bogomolova et al. 2015), and artificial and sugar-sweetened beverages (Kaur et al. 2020). Once purchased, price-promoted palatable foods are suggested to be consumed more quickly and in larger quantities during the short term, particularly where 'impulse' or 'stockpile' purchases occur (Aschemann-Witzel 2018; Watt et al. 2020, 2023).

'Meal deals' are a type of bundle offer that are particularly popular in the UK (Bogomolova et al. 2015). Lunchtime deals typically include a ready-to-eat main meal (e.g. sandwiches and salads), snack (e.g. crisps, chocolate, fruit) and drink (e.g. carbonated drinks, coffee, juices), all of which are offered as a bundle at a discounted price compared to purchasing items separately (Leek and Afoakwah 2023). Similarly, dinnertime deals include a pre-prepared main dish intended to be reheated at home (e.g. pizzas, pastas, curries), alongside complementary items to accompany the meal (e.g. drinks, sides, desserts and dips). Where lunchtime deals are intended to be eaten by an individual, dinnertime deals often include multiple servings to be shared among couples or families (typically two adult and two child portions), though in both scenarios, items are intended to be consumed in a single sitting. Lunchtime deals have been estimated to contain up to 1329 kcal per serving (Leek and Afoakwah 2023), more than double the 600 kcal recommended intake for a midday meal (Public Health England 2018). Dinnertime deals have also been shown to significantly increase the number of items in shopping baskets, as consumers underestimate the total amount of food purchased (Kobuszewki Volles et al. 2024).

Though meal deals may result in overconsumption when choosing higher-energy/kcal options, they also present an opportunity to significantly improve meal composition where promotions encourage appropriate and acceptable bundles. From a policy perspective, several nutrient profile (NP) models exist to guide food standards and marketing requirements (Labonté et al. 2018). These often score products for nutritional quality and identify reference amounts for recommended intake (e.g. energy/kcal or nutrient content per weight or individual serving). Though NP models have typically been applied to specialist settings and target populations (e.g. school food, health facilities) (Labonté et al. 2018), the UK Government recently passed legislation to restrict the promotion and placement of pre-packaged HFSS foods where this may lead to overconsumption (Public Health England 2021; Welsh Government 2025). This includes limiting multi-buy offers as well as sugar-sweetened soft drink promotions and refills. Whilst these restrictions are not yet applicable to lunch or dinner meal deals in England (Public Health England 2021), beginning in March 2026, for the first time, 'relevant special offers' will be eligible for restriction in Wales where multiple items are promoted as a single meal (Public Health Wales 2025). However, professional consensus for approaches to policy implementation remains unclear.

With an exploratory case study focus on Wales as a UK nation, this policy Delphi study aimed to assess expert consensus for regulating supermarket offers of lunch and dinner meal deals, consolidating recommendations for the use of different nutritional thresholds based on energy and HFSS food status in an NP model. This included two key objectives: (1) to explore expert opinion on the recommended adult and child portions for meal deals, where items and bundles may be labelled as containing multiple portions, and (2) to establish consensus for the recommended nutrient levels (energy, total fat, sugar and salt) that should be consumed at lunch and dinner, considering intended portion sizes for adults and children.

Materials and methods

Study design

Using a variation of the policy Delphi technique (Franklin and Hart 2007), a multidisciplinary panel with professional expertise in public health, nutrition and obesity was consulted on implementation of the meal deals legislation (Public Health Wales 2025). This technique is particularly helpful where multiple models for implementation exist, providing an opportunity for experts to reflect on peer feedback and strengthen evidence for the final approach (Franklin and Hart 2007; Cubelo et al. 2024). It involved two key components. First, three iterations of an online survey were used to identify the acceptability of different nutritional thresholds and reference guidelines for an NP model. Second, an online panel meeting was used to confirm agreement with

recommendations, including opportunities for feedback and a final vote. Figure 1 provides an overview of the Delphi process. Full surveys are available on the Open Science Framework (OSF) repository (https://osf.io/5u6gk/), and reporting of this study aligns with best practice recommendations for the Delphi method (Franklin and Hart 2007).

Participants

A targeted, purposive approach to recruitment was used to identify stakeholders working in areas aligned to diet, nutrition and obesity in Wales. To facilitate this approach, the lead Public Health Consultant (IJ) invited contacts from existing organisation networks with broad reach across public health, healthcare, academia and third sector. Sample size guidelines for Delphi studies recommend recruiting between 10 and 15 stakeholders where expertise and professional backgrounds are relatively homogeneous (Taylor 2020). To account for variability between sectors, 38 participants were initially contacted to join the panel via a personalised email invitation, and a smaller list of additional contacts ($N = 10$) was collated via wider professional networks to combat participant attrition in follow-up rounds. This meant that a total of 48 stakeholders were invited to take part across rounds.

Abiding by national policy for research ethics (Health Research Authority), a protocol for the study was submitted internally to the Public Health Wales Research & Development Division, which advised that National Health Service (NHS) Research Ethics approval was not required. All participants completed the study on a voluntary basis and responded to recommendations in a professional stakeholder capacity. Information about the study was included at the beginning of each survey round and meeting. All participants were aware of the study aims from the outset and were clearly informed of their right to withdraw. All participants subsequently consented to taking part by continuing with the study and submitting a response.

Surveys

A series of online surveys were created using Microsoft Forms (https://forms.office.com/) and circulated to stakeholders at three different time points between May and June 2023. Though the term 'meal deal' was not specifically defined in the first round, stakeholders were asked to respond to 'lunch' and 'dinner' as two distinct promotions, with explanations of both the bundle type (i.e. item combinations) and number of intended servings (i.e. single, couple or family of four) included in subsequent rounds. Though all contacts were invited to complete the second-round survey (regardless of participation in the first round), only those completing the second-round survey were invited to the final-round survey. Each survey was completed in approximately 10–20 min, and all participants had the option to submit responses in Welsh or English.

For the first-round survey, stakeholders were presented with three NP models relating to: (1) limiting the total energy per person for a purchased meal, (2) mandating the proportion of daily nutrients (energy, fat, sugar and salt) for a purchased meal, and (3) scoring individual items for HFSS levels (relative to fruit, vegetable and nut content, fibre and protein), excluding those with an overall 'maximum' (higher) score classified as 'less healthy' (Department of Health 2011). Stakeholders were asked to indicate

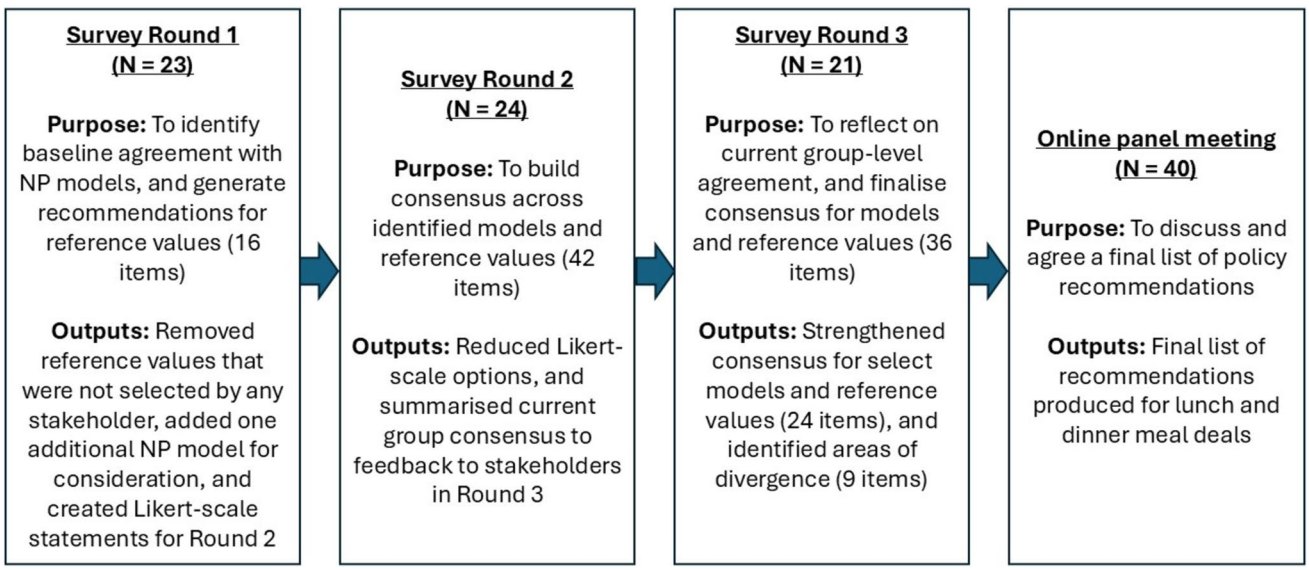

Fig. 1 Overview of the Delphi process

their level of agreement with each model using a five-point Likert scale (from 'Strongly disagree' to 'Strongly agree'). They were then asked to select the most appropriate reference intake values for the first two models as a single-option response (British Nutrition Foundation 2021). For dinner, this included the recommended limit for energy per person for a meal (ranging from 600 to 1100 kcal), and the recommended proportional limit per adult and child for daily nutrients provided by a purchased meal (ranging from 30% to 50%), identifying the most appropriate child age to use in an open-text field. For lunch, this included the recommended limit for energy per person for a meal (ranging from 400 to 900 kcal), and the recommended proportional limit per adult for daily nutrients provided by a purchased meal (ranging from 20% to 45%). Where relevant, stakeholders had the option to select 'Other/Don't know', and could provide additional recommended models, reference values or criteria in an open-text field.

For the second-round survey, stakeholders responded to the same models identified in the first round. However, they were asked to indicate their level of agreement with each model and associated reference values using a three-point Likert scale ('Disagree' – 'Neutral' – 'Strongly agree'). Where appropriate, additional models suggested by stakeholders were included for consideration, and the range of reference values presented were reduced in line with panel consensus. They could also select 'Other/Don't know', and could continue to provide additional recommended models, reference values or criteria in an open-text field.

For the final-round survey, stakeholders were presented with a visual summary of previous round responses, including current group-level agreement for each model and reference value expressed as a cumulative percentage. They were asked to either 'Agree' or 'Disagree' with each item as their final survey response, or otherwise refrain from responding by selecting 'Prefer not to comment'. Where relevant, any final suggestions or feedback about their participation in the study were provided in an open-text field.

Online panel meeting

A final panel meeting was held in December 2023 to discuss survey recommendations. With the addition of one new stakeholder at this stage, all invitees to survey rounds ($N=47$) were contacted to attend a group meeting or one-to-one discussion with a member of the research team (IJ) hosted via Microsoft Teams (https://teams.microsoft.com). Prior to discussion, all stakeholders received a summary of survey results via email, including the level of consensus reached for each recommendation across survey rounds. This allowed stakeholders to engage in an open discussion of recommendations, including reasons for agreement and disagreement shared among peers. All stakeholders were invited to respond to a final vote for draft recommendations, selecting 'Agree' or 'Disagree' for each statement when submitting a response.

Data analysis

Across surveys and the final vote, frequency of agreement (disagreement) was calculated for recommended models and reported as a percentage across relative values (i.e. 'Strongly agree' and 'Agree', vs 'Strongly disagree' and 'Disagree'). In line with similar Delphi approaches for public health (Dedewanou et al. 2023; Embling et al. 2025), the target level of agreement for each recommendation was set to 70% of stakeholders (excluding neutral/abstain responses) to revise statements and measure consensus. Where appropriate, reference values associated with models were removed from consideration in round 1 if these were not selected by any stakeholder. Otherwise, item changes were minimal across rounds. As additional measures of consistency between panellists, intra-class correlation coefficients (ICC) and Fleiss' kappa were used to indicate inter-rater reliability within and between stakeholders for each survey round, and Cronbach's alpha was used as a measure of internal consistency across statements (excluding one item as variance was equal to 0). Higher values indicate greater consistency within and between stakeholders for each survey round, reaching 'moderate' levels where values exceed 0.60 (McHugh 2012).

Results

Sample characteristics

Stakeholder characteristics are shown in Table 1. This included 23 of 38 experts (61% of invitees) responding to the first-round survey, 24 of 47 experts (51% of invitees) responding to the second-round survey, and 21 of 24 experts (88% of invitees) responding to the final-round survey. Though only 15 of 48 experts (31% of invitees) included in the overall sample attended the online panel meeting, 41 experts (85% of invitees) responded to the final vote.

Surveys

Tables 2 and 3 display responses for each NP model and reference value, respectively. Based on open suggestions from round 1, mandating minimum portions for fruits and vegetables was considered as an additional approach for rounds 2 and 3, meaning that four models were included across rounds. For both lunch and dinner, mandating the proportion of daily nutrients provided by a purchased meal and including minimum fruit or vegetable portions achieved the strongest consensus (reaching > 90%).

Table 1 Sample characteristics for stakeholders across rounds

	Surveys						Online panel meeting	
	Round 1 ($N=23$)		Round 2 ($N=24$)		Round 3 ($N=21$)		Final vote ($N=41$)	
	No.	%	No.	%	No.	%	No.	%
Sector								
Dietetics	5	22	5	21	5	24	12	26
Public health	10	44	10	42	10	48	13	28
Academia	2	9	4	17	3	14	7	15
Medical professional	6	26	5	21	3	14	8	17
Third sector	1	4	1	4	1	5	1	2
Job role								
Dietician	4	17	5	21	5	24	12	26
Academic nutritionist	7	30	7	29	7	33	6	13
Public health nutritionist	1	4	1	4	1	5	1	2
Public health consultant	2	9	2	8	1	5	6	13
Public health practitioner	3	13	3	13	3	14	6	13
Consultant surgeon (weight management)	1	4	1	4	0	0	2	4
Nursing (weight management)	0	0	0	0	0	0	1	2
Dentist	3	13	3	13	2	10	3	6
General practitioner/family physician	1	4	0	0	0	0	2	4
Research	0	0	1	4	1	5	1	2
Other	1	4	1	4	1	5	1	2

Table 2 Consensus statements to identify recommended models for lunch and dinner meal deals[a,b,c]

	Round 1			Round 2			Round 3	
	Agree %	Neutral %	Disagree %	Agree %	Neutral %	Disagree %	Agree %	Disagree %
Lunch								
Limit for the total energy (kcal) per person for a total meal	52	30	17	42	25	29	38	57
Mandating the proportion of daily nutrients for a total meal (energy, fat, sugar, salt)	**83**	9	8	**79**	13	4	**90**	0
Scoring eligible items for HFSS levels using 'maximum' scores	39	39	4	25	50	4	14	57
Mandating the inclusion of minimum fruit or vegetable portions for a total meal	–	–	–	**83**	17	0	**95**	5
Dinner								
Limit for the total energy (kcal) per person for a total meal	44	35	17	38	21	33	33	57
Mandating the proportion of daily nutrients for a total meal (energy, fat, sugar, salt)	**83**	9	8	**79**	8	4	**95**	0
Scoring eligible items for HFSS levels using 'maximum' scores	39	39	4	25	46	8	14	62
Mandating the inclusion of minimum fruit or vegetable portions for a total meal	–	–	–	**79**	13	4	**100**	0

[a] Remaining stakeholders responded 'Don't know' or 'N/A' for statements where percentages do not sum to 100%

[b] Values reaching consensus, ≥ 70% (bold)

[c] Dashes indicate that an item was not included for consideration in the survey round

Table 3 Consensus statements to identify model reference values for lunch and dinner meal deals.[a,b,c]

	Round 1		Round 2			Round 3	
	Single-option response		Likert-scale response			Likert-scale response	
	N	%	Agree %	Neutral %	Disagree %	Agree %	Disagree %
Lunch							
'*What would be the recommended limit for the energy per adult for a meal?*'							
400 kcal	2	9	17	33	38	14	**71**
500 kcal	6	26	42	33	13	67	19
600 kcal	4	17	38	25	21	62	19
700 kcal	2	9	13	29	38	10	67
800 kcal	2	9	8	8	63	5	**76**
900 kcal	0	0	–	–	–	–	–
'*What would be the recommended limit for the proportion of nutrients per adult?*'							
20%	0	0	–	–	–	–	–
25%	0	0	–	–	–	–	–
30%	11	48	63	17	8	**71**	14
35%	2	9	29	46	8	43	33
40%	2	9	13	33	33	14	67
45%	0	0	0	21	58	0	**81**
50%	–	–	8	4	67	0	**86**
Dinner							
'*What would be the recommended limit for the energy per adult for a meal?*'							
600 kcal	4	17	29	38	25	29	57
700 kcal	4	17	29	33	29	33	38
800 kcal	3	13	42	17	29	52	24
900 kcal	5	22	21	29	33	19	57
1000 kcal	0	0	8	21	54	5	**76**
1100 kcal	0	0	–	–	–	–	–
'*What would be the recommended limit for the proportion of nutrients per adult?*'							
30%	5	22	29	25	29	33	43
35%	2	9	25	33	21	52	14
40%	4	17	25	21	33	38	43
45%	3	13	25	21	33	19	57
50%	2	9	21	17	50	5	**71**
'*What would be the recommended age range to use for the child portions?*'							
2–3 years	–	–	4	8	63	0	**86**
4–6 years	–	–	17	29	25	14	57
7–10 years	–	–	63	8	0	**76**	0
11–14 years	–	–	17	33	21	33	33
15–18 years	–	–	4	8	58	5	**71**

[a] Remaining stakeholders responded 'Don't know' or 'N/A' for statements where percentages do not sum to 100%

[b] Values reaching consensus, ≥ 70% (bold)

[c] Dashes denote that an item was not included for consideration in the survey round

Specifically, stakeholders identified 30% as the most appropriate proportional limit for lunch (reaching 71%). Though no limit achieved consensus agreement for dinner, consensus disagreement indicated that this should be set below 50% of the recommended daily intake (reaching 71%). This aligned with recommendations for energy intake, as consensus disagreement indicated that purchased meals should be limited to between 500 and 800 kcal for lunch (reaching > 70%), and below 1000 kcal for dinner (reaching 76%). Most stakeholders also agreed with limiting nutritional content for family meal deals based on recommendations for a 7–10-year-old (reaching 76%).

Consistency within and between respondents improved with each survey round. For lunch, there was high internal consistency between items included in rounds 2 (α = 0.73) and 3 (α = 0.87). Though agreement across all items among panellists remained 'low' (round 2 average weighted kappa = 0.19, ICC = 0.23, 95% confidence interval (CI) [0.11, 0.46]; round 3 average weighted kappa = 0.33, ICC = 0.36, 95% CI [0.21, 0.61]), Fleiss' kappa indicated better group-level agreement where stakeholders selected 'agree' for items in rounds 2 (κ = 0.31, 95% CI [0.28, 0.35]) and 3 (κ = 0.43, 95% CI [0.40, 0.47]). For dinner, there was also high internal consistency between items included in rounds 2 (α = 0.70) and 3 (α = 0.91). Though agreement across all items among panellists remained 'low' (round 2 average weighted kappa = 0.10, ICC = 0.12, 95% CI [0.05, 0.26]; round 3 average weighted kappa = 0.23, ICC = 0.26, 95% CI [0.15, 0.46]), Fleiss' kappa indicated better group-level agreement where stakeholders selected 'agree' for items in rounds 2 (κ = 0.17, 95% CI [0.14, 0.21]) and 3 (κ = 0.33, 95% CI [0.30, 0.36]).

Online panel meeting

All models and reference values from surveys were included for discussion as stakeholders voted on recommendations for policy ($N = 41$). Though one stakeholder abstained from voting due to self-perceived limits in their area of expertise, all others agreed with the final list of recommendations (Table 4). Overall, it was suggested that a purchased meal deal (all items combined) should align with the recommended proportion of daily intakes agreed for lunch and dinner, including the provision of fruits and/or vegetables. As such, preferred models were focussed on the energy/kcal and nutrients to be consumed as part of a purchased meal and/or intended portion, rather than excluding specific food groups (such as HFSS snacks).

Discussion

This policy Delphi study explored consensus for regulating supermarket offers of lunch and dinner meal deals in Wales. To date, models to regulate the placement and promotion of food products have typically focussed on restricting eligibility of individual food items or categories, particularly where these are scored for multiple nutrients or components (Labonté et al. 2018). Importantly, meal deals are unique in that individual items may score favourably in traditional models, but when combined, promoted items can significantly exceed the recommended intake thresholds across nutrients for a single meal (Leek and Afoakwah 2023). As previous policy and research efforts have focussed on single-item promotions (Kaur et al. 2020; Public Health England 2021), meal deals and other bundle offers have often been excluded from eligibility despite having the potential to significantly influence short-term consumption (Aschemann-Witzel 2018; Watt et al. 2020, 2023). Therefore, our findings highlight two alternative models for implementation: (1) mandating the proportion of daily nutrients (including energy/kcal, fat, sugar and salt) provided by a purchased meal to limit overconsumption, and (2) including minimum fruit or vegetable portions as part of the main or add-on items to increase fibre and nutritional quality.

Throughout this study, several reference intake values were considered as nutritional thresholds to limit product combinations as part of meal deals. For lunch, stakeholder consensus indicated that the total meal offered (i.e. main item, snack and drink) should not exceed 30% of the daily

Table 4 Final consensus recommendations for lunch and dinner meal deals ($N = 40$)[a]

Lunch	Dinner
The total meal offered (i.e. main item, snack and drink) should not exceed 30% of the daily reference intake for specified nutrients (energy/kcal, total fat, sugars and salt)	Intended servings included in the total meal (i.e. main item, drink and add-on items) should not exceed 40% of the daily reference intake for specified nutrients (energy/kcal, total fat, sugars and salt)
The total meal offered should include a minimum of 30% of the recommended 30 g of fibre per day (9 g)	Where deals are advertised for consumption by two people, the total meal should include two equal portions across all items
At least one portion (80 g) of whole fruits and vegetables should be included as part of the total meal	Where deals are advertised for consumption by families (i.e. two adults and two children), the total meal should not exceed 40% of the daily reference intake based on requirements for children aged 7–10 years
Whole fruits should be available to choose as a snack option	The total meal offered should include a minimum of 40% of the recommended 30 g of fibre per day (12 g for adults and 8 g for children)
References to healthy eating should be included as part of meal deal guidance	Main items should include at least one portion (80 g) of whole fruits and vegetables per person (adult or child)
	References to healthy eating should be included as part of meal deal guidance

[a]Fibre, fruit and vegetable content were agreed as a proportion of recommended intake and updated here to represent the recommended portion size

reference intake for specified nutrients (the adult equivalent of 600 kcal, 23 g total fat, 8 g sugars and 1.8 g salt; British Nutrition Foundation 2021). For dinner, this was slightly higher at 40% of the daily reference intake (the adult equivalent of 800 kcal, 28 g total fat, 36 g sugars and 2.4 g salt; British Nutrition Foundation 2021). However, it was also specifically related to intended serving size (where deals include more than one serving), and where applicable for family meal deals, was suggested to align with nutritional requirements for children aged 7–10 years to maintain appropriate portions. In the context of restricting marketing of unhealthy foods to children, similar recommendations have already been made for nutritional thresholds in international standards for fat (30% of energy/kcal intake), sugar (10% of energy/kcal intake) and salt (2 g/day) intakes (World Health Organization 2023), highlighting alignment with broader strategies to improve diet quality across populations in the space of out-of-home advertising (Kirk et al. 2010; Townshend and Lake 2017; Papagiannaki and Kerr 2024).

In order to meet these guidelines for meal deals, industry responses may include a range of strategies for HFSS foods: (1) removal of select items from promotion, (2) product reformulation to support eligibility in line with target nutritional thresholds (Lehmann et al. 2017), and (3) prepackaged portion size reduction to meet proportional limits without changing the offer (Arnold and Hackett 2012). Our study suggests that a relatively small number of items would need to be removed, reformulated or repackaged to meet a target of 30–40% for daily reference intake. For example, over 70% of lunch combinations already meet the 600 kcal target for energy (Leek and Afoakwah 2023). Though we did not specifically explore consensus for how to achieve policy recommendations, research suggests that public acceptance of food policy is higher where strategies focus on maximum limits for nutritional levels (e.g. reducing salt content in food products) rather than requiring or restricting specific food groups (Kwon et al. 2019), highlighting reformulation and repackaging as potentially more acceptable responses than removing items from meal deals (such as crisps, chocolate and confectionary). Our study was limited to experts with health-related perspectives with some attrition observed across rounds; therefore, future research should consider how industry stakeholders and consumers respond to these regulations. It will also be important to specifically monitor changes to the nutritional content of meal deal combinations over time to understand potential impacts. This includes addressing the gap in knowledge around the energy/kcal, fat, sugar and salt content promoted in current meal deals, particularly as this relates to dinner, where the energy density of main items is likely to be high but variable: for example, supermarket brands of pepperoni pizza have been shown to range between 501 and 1909 kcal per pizza (Hardman et al. 2015).

Whilst this study has demonstrated strong expert support for regulating supermarket offers of lunch and dinner meal deals overall, it is also important to acknowledge potential unintended consequences of the policy (both positive and negative) which were not directly discussed among stakeholders. There is ongoing debate around the association between ultra-processed foods and drivers of obesity (Valicente et al. 2023), and focussing on HFSS content alone does not address all of these concerns (e.g. the use of process-refined ingredients and additives, and the loss of nutrients during processing; Scrinis and Monteiro 2018). Limiting meal deals may also encourage the provision of smaller and more appropriate portion sizes, particularly for children: on the one hand, this may create barriers for sustainable production (e.g. where this increases packaging costs and waste, and reduces perceived value-for-money) (Arnold and Hackett 2012), but there may also be opportunities to reduce ingredient costs and support a quality-for-money strategy (Almiron-Roig et al. 2020). Further, research suggests that shrinking portions may not be tolerated by consumers when these are perceived to be abnormally small, in turn encouraging additional compensatory purchases and intake (Shahrokni et al. 2021). To our knowledge, this has only been explored for individual items, and future research may explore portion size norms and choice boundaries for product bundles in the context of meal deals, particularly as these may be more flexible when purchasing items in combination and on promotion.

This study also highlighted expert consensus for improving the provision of fruits and vegetables as part of the meal deal offer. At present, most promotions apply to HFSS foods in supermarkets more broadly (Bogomolova et al. 2015; Kaur et al. 2020), and main items that contain higher fruit and vegetable content (e.g. salads) and whole fruit and vegetable snacks often make up a smaller proportion of eligible products for meal deals (Leek and Afoakwah 2023). In addition to addressing HFSS products, increasing the quantity and variety of fruit and vegetable items can rebalance the availability of products for consumers without reducing choice. However, as a promotion focussed on fresh and ready-to-eat foods, products often have a shorter shelf life, therefore increasing the likelihood of food waste (both for supermarkets and consumers). Whilst food waste concerns were not discussed with stakeholders in our study, increasing fruit and vegetable offerings may further contribute to potential waste, particularly where these are pre-prepared (e.g. peeled and sliced). This highlights an opportunity for retailers to contribute to food bank and food sharing schemes (e.g. as part of the UK Food and Drink Pact; WRAP 2025). Further research should explore the impact of meal deals on overconsumption and food waste patterns to help optimise offers for both health and environmental impacts (Tsalis et al. 2021).

Conclusion

To support the implementation of policy for healthy food environments, this study identifies expert consensus on approaches for regulating supermarket lunch and dinner meal deals. Following four rounds of survey and workshop consultations, findings support the use of a proportional nutrient-based model that limits the content of purchased meals to 30% and 40% of daily recommended intakes, including energy/kcal, respectively. Findings also highlight opportunities to further improve nutritional quality, by recommending minimum fruit or vegetable portions as part of offers to increase fibre content. As such, this study provides important insights for current and future policy development, identifying key areas of consideration for promoting the provision and uptake of healthy and acceptable food bundles.

Authors' contributions Dr Rochelle Embling: Investigation, formal analysis, writing – original draft, writing – review & editing. Dr Vasiliki Kolovou: Methodology, investigation, writing – review & editing. Anna Kolosowska: Investigation, formal analysis, writing – review & editing. Niamh Mchugh: Investigation, formal analysis, writing – review & editing. Dr Sara Long: Writing – review & editing. Dr Ilona Johnson: Conceptualisation, methodology, investigation, formal analysis, writing – review & editing, project supervision, project administration. All authors read and approved the final submission.

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Data availability The data underlying this article will be shared on reasonable request to the corresponding author.

Declarations

Ethics approval and consent to participate Abiding by National policy for research ethics (Health Research Authority), a protocol for the study was submitted to the Public Health Wales Research & Development Division, which advised that NHS Research Ethics approval was not required. All participants completed the study on a voluntary basis and responded to recommendations in a professional stakeholder capacity. Information about the study was included at the beginning of each survey round and meeting. All participants were aware of the study aims from the outset and were clearly informed of their right to withdraw. All participants subsequently consented to taking part by continuing with the study and submitting a response.

Consent for publication N/A.

Code availability N/A.

Conflicts of interest This study was completed as part of the Nutrition & Obesity programme at Public Health Wales. This includes a funded remit to provide evidence aligned with 'Healthy Weight Healthy Wales' legislation. Public Health Wales placed no restrictions on the study design, methodology, findings or outputs of this work.

References

Adam A, Jensen JD (2016) What is the effectiveness of obesity related interventions at retail grocery stores and supermarkets? - a systematic review. BMC Public Health 16:1–18. https://doi.org/10.1186/S12889-016-3985-X

Afshin A, Sur PJ, Fay KA et al (2019) Health effects of dietary risks in 195 countries, 1990–2017: a systematic analysis for the global burden of disease study 2017. Lancet 393:1958–1972. https://doi.org/10.1016/S0140-6736(19)30041-8

Almiron-Roig E, Forde CG, Hollands GJ et al (2020) A review of evidence supporting current strategies, challenges, and opportunities to reduce portion sizes. Nutr Rev 78:91–114. https://doi.org/10.1093/nutrit/nuz047

Arnold H, Hackett R (2012) Filling the gaps: the need for more research on portion size of pre-packaged foods and intake behaviour. Nutr Bull 37:364–367. https://doi.org/10.1111/j.1467-3010.2012.01995.x

Aschemann-Witzel J (2018) Consumer perception and preference for suboptimal food under the emerging practice of expiration date based pricing in supermarkets. Food Qual Prefer 63:119–128. https://doi.org/10.1016/J.FOODQUAL.2017.08.007

Bagnall A-M, Radley D, Jones R et al (2019) Whole systems approaches to obesity and other complex public health challenges: a systematic review. BMC Public Health 19:1–14

Bogomolova S, Dunn S, Trinh G et al (2015) Price promotion landscape in the US and UK: depicting retail practice to inform future research agenda. J Retail Consum Serv 25:1–11. https://doi.org/10.1016/J.JRETCONSER.2014.08.017

British Nutrition Foundation (2021) Nutrition Requirements

Burgoine T, Sarkar C, Webster CJ, Monsivais P (2018) Examining the interaction of fast-food outlet exposure and income on diet and obesity: evidence from 51,361 UK Biobank participants. Int J Behav Nutr Phys Act 15:1–12. https://doi.org/10.1186/S12966-018-0699-8/TABLES/5

Cubelo F, Turunen H, Jokiniemi K (2024) Recruit, integrate, and retain: internationally educated nurses mobility to the Nordic region: a two-round policy Delphi study. Nurs Outlook 72:102299. https://doi.org/10.1016/J.OUTLOOK.2024.102299

Dedewanou FA, Allin S, Guyon A et al (2023) Prioritization of public health financing, organization, and workforce transformation: a Delphi study in Canada. BMC Public Health 23(1):1–9. https://doi.org/10.1186/S12889-023-15373-9

Department of Health (2011) Nutrient Profiling Technical Guidance. London

Embling R, Pink AE, Gatzemeier J et al (2021) Effect of food variety on intake of a meal: a systematic review and meta-analysis. Am J Clin Nutr 113:716–741. https://doi.org/10.1093/ajcn/nqaa352

Embling R, Evans R, Mchugh N et al (2025) Expert opinions on an optimal infant feeding quantitative data framework: a mixed methods Delphi-style study in the UK. J Hum Nutr Diet 38:e70025. https://doi.org/10.1111/JHN.70025

Finegood DT, Merth TDN, Rutter H (2010) Implications of the foresight obesity system map for solutions to childhood obesity. Obesity Journal 18:S13–S16

Franklin KK, Hart JK (2007) Idea generation and exploration: Benefits and limitations of the policy Delphi research method. Innov High Educ 31:237–246. https://doi.org/10.1007/S10755-006-9022-8/METRICS

Golding SE, Bondaronek P, Bunten AK et al (2022) Interventions to change purchasing behaviour in supermarkets: a systematic review and intervention content analysis. Health Psychol Rev 16:305–345. https://doi.org/10.1080/17437199.2021.1911670

Hardman CA, Ferriday D, Kyle L et al (2015) So many brands and varieties to choose from: does this compromise the control of food intake in humans? PLoS ONE 10:e0125869–e0125869. https://doi.org/10.1371/journal.pone.0125869

Hawkes C (2009) Sales promotions and food consumption. Nutr Rev 67:333–342. https://doi.org/10.1111/J.1753-4887.2009.00206.X

Health Research Authority (2024) Is my study research? In: 2024. https://www.hra-decisiontools.org.uk/research/. Accessed 18 Mar 2024

Johnson F, Wardle J (2014) Variety, palatability, and obesity. Adv Nutr 5:851–859. https://doi.org/10.3945/AN.114.007120

Kaur A, Lewis T, Lipkova V et al (2020) A systematic review, and meta-analysis, examining the prevalence of price promotions on foods and whether they are more likely to be found on less-healthy foods. Public Health Nutr 23:1281–1296. https://doi.org/10.1017/S1368980019004129

Kirk SFL, Penney TL, McHugh TLF (2010) Characterizing the obesogenic environment: the state of the evidence with directions for future research. Obes Rev 11:109–117. https://doi.org/10.1111/J.1467-789X.2009.00611.X

Kobuszewki Volles B, Ribbers D, Van Kerckhove A, Geuens M (2024) Beyond bundles: Choosing product bundles increases shopping basket size. J Retail Consum Serv 81:104035. https://doi.org/10.1016/J.JRETCONSER.2024.104035

Kwon J, Cameron AJ, Hammond D et al (2019) A multi-country survey of public support for food policies to promote healthy diets: findings from the International Food Policy Study. BMC Public Health 19(1):1–10. https://doi.org/10.1186/S12889-019-7483-9

Labonté ME, Poon T, Gladanac B et al (2018) Nutrient profile models with applications in government-led nutrition policies aimed at health promotion and noncommunicable disease prevention: a systematic review. Adv Nutr 9:741–788. https://doi.org/10.1093/ADVANCES/NMY045

Lee BY, Bartsch SM, Mui Y et al (2017) A systems approach to obesity. Nutr Rev 75:94–106. https://doi.org/10.1093/NUTRIT/NUW049

Leek S, Afoakwah D (2023) Lunch meal deals contribution to overconsumption and use of the intervention ladder models to examine stakeholders' potential actions to reduce calorie content. J Mark Manage 39:648–669. https://doi.org/10.1080/0267257X.2022.2157462

Lehmann U, Charles VR, Vlassopoulos A et al (2017) Nutrient profiling for product reformulation: public health impact and benefits for the consumer. Proc Nutr Soc 76:255–264. https://doi.org/10.1017/S0029665117000301

McHugh ML (2012) Interrater reliability: the kappa statistic. Biochem Med Zagreb 22:276–282

Nielsen SJ, Popkin BM (2003) Patterns and trends in food portion sizes, 1977–1998. JAMA 289:450–453. https://doi.org/10.1001/JAMA.289.4.450

Nielsen SJ, Popkin BM (2004) Changes in beverage intake between 1977 and 2001. Am J Prev Med 27:205–210. https://doi.org/10.1016/J.AMEPRE.2004.05.005

Papagiannaki M, Kerr MA (2024) Food portion sizes: trends and drivers in an obesogenic environment. Nutr Res Rev. https://doi.org/10.1017/S0954422424000027

Public Health England (2018) Plans to cut excess calorie consumption unveiled. https://www.gov.uk/government/news/plans-to-cut-excess-calorie-consumption-unveiled. Accessed 17 Mar 2025

Public Health England (2021) The food (promotion and placement) (England) regulations 2021. King's Printer of Acts of Parliament

Public Health Wales (2025) The food (promotion and presentation) (Wales) Regulations 2025

Rolls BJ (2009) The relationship between dietary energy density and energy intake. Physiol Behav 97:609–615. https://doi.org/10.1016/j.physbeh.2009.03.011

Scrinis G, Monteiro CA (2018) Ultra-processed foods and the limits of product reformulation. Public Health Nutr 21:247–252. https://doi.org/10.1017/S1368980017001392

Shahrokni RO, Ferriday D, Miguel S, et al (2021) "This snack is too small-I'll take a different one": quantifying 'norm' and 'choice' boundaries to inform effective portion-reduction strategies. https://doi.org/10.1016/j.appet.2021.105886

Swinburn BA, Kraak VI, Allender S et al (2019) The global syndemic of obesity, undernutrition, and climate change: the Lancet Commission report. Lancet 393:791–846. https://doi.org/10.1016/S0140-6736(18)32822-8

Taylor E (2020) We agree, don't we? The delphi method for health environments research. HERD Health Environ Res Des 13(1):11–23. https://doi.org/10.1177/1937586719887709

Townshend T, Lake A (2017) Obesogenic environments: current evidence of the built and food environments. Perspect Public Health 137:38–44. https://doi.org/10.1177/1757913916679860

Tsalis G, Jensen BB, Wakeman SW, Aschemann-Witzel J (2021) Promoting food for the trash bin? A review of the literature on retail price promotions and household-level food waste. Sustainability (Switzerland) 13:4018. https://doi.org/10.3390/SU13074018/S1

Valicente VM, Peng CH, Pacheco KN et al (2023) Ultraprocessed foods and obesity risk: a critical review of reported mechanisms. Adv Nutr 14:718–738. https://doi.org/10.1016/J.ADVNUT.2023.04.006

Vilar-Compte M, Burrola-Méndez S, Lozano-Marrufo A et al (2021) Urban poverty and nutrition challenges associated with accessibility to a healthy diet: a global systematic literature review. Int J Equity Health 20:1–19. https://doi.org/10.1186/S12939-020-01330-0. (**/FIGURES/3**)

Watt TL, Beckert W, Smith RD, Cornelsen L (2020) Reducing consumption of unhealthy foods and beverages through banning price promotions: what is the evidence and will it work? Public Health Nutr 23:2228–2233. https://doi.org/10.1017/S1368980019004956

Watt T, Beckert W, Smith R, Cornelsen L (2023) The impact of price promotions on sales of unhealthy food and drink products in British retail stores. Health Econ 32:25–46. https://doi.org/10.1002/HEC.4607

Welsh Government (2025) New curbs on unhealthy food promotions to tackle Wales' rising obesity levels. In: Welsh Government. https://www.gov.wales/new-curbs-unhealthy-food-promotions-tackle-wales-rising-obesity-levels. Accessed 18 Mar 2025

World Health Organization (2023) WHO Regional Office for Europe nutrient profile model

WRAP (2025) UK Food and Drink Pact. https://www.wrap.ngo/take-action/uk-food-drink-pact. Accessed 12 May 2025

Zhou Q, Zhao L, Zhang L et al (2021) Neighborhood supermarket access and childhood obesity: a systematic review. Obes Rev 22(S1):e12937. https://doi.org/10.1111/OBR.12937

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