Contents

Evidence Base

Problem under consideration

1. Childhood obesity is one of the biggest health problems this country faces. Nearly a quarter of children in England are obese or overweight by the time they start primary school aged five, and this rises to one third by the time they leave aged 11[2]. Obesity is a global issue, with rates doubling since 1980. The WHO estimates that over 600 million adults were obese in 2016, about 13% of the global population[3]. As of 2015, no country had reversed its obesity epidemic[4].

2. Obesity is a major cause of ill health in the UK, causing heart disease, stroke, type II diabetes, and cancer. Obese females are over ten times more likely to develop type II diabetes than their healthy weight counterparts, with obese males over five times more likely[5]. This imposes a substantial burden on the NHS, with overweight and obesity costing the health service in England £5.1bn in 2014/15[6]. Obesity causes further costs to society and government through premature mortality, increased sickness absence and additional benefit payments.

3. In 2016, 61% of adults were classified as overweight or obese, with 26% being obese. Amongst children, the equivalent figures were 28% and 16% respectively[7]. Obese children tend to remain overweight and become obese adults. Moreover, the more obese the child is, the higher the chance of them becoming an obese adult.

4. For example, based on analysis of the 1958 birth cohort, 38% girls who were above the 91st BMI percentile at age 7 went on to become obese at age 33, while 60% of girls who were above the 98th BMI percentile at age 7 were obese at age 33[8].

5. Without action, the burdens of obesity and its related conditions are expected to grow substantially over time. Projections suggest that the proportion of the UK adult population who are obese will increase significantly over the coming decades[9].

6. There are also significant inequalities in childhood obesity rates by socioeconomic group. The obesity prevalence is higher among children from more deprived families than among the least deprived children[10]. Likewise, the Food and You survey (2014)[11] reports that unemployed respondents were more likely to report having takeaway and fast food compared with those in work.

Rationale for intervention

7. The demand for food stems largely from two distinct channels – the requirement to consume sufficient energy and nutrients to survive, and the pleasure derived from the taste, texture and aroma. While additional consumption of food will continue to deliver benefits to an individual through

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[2] NHS Digital. (2017). National Child Measurement Programme 2016/17

[3] WHO Obesity factsheet http://www.who.int/mediacentre/factsheets/fs311/en/ (last accessed 23/02/18)

[4] Roberto, CA (2015) 'Patchy progress on obesity prevention: emerging examples, entrenched barriers, and new thinking' www.thelancet.com (last accessed 23/02/2018)

[5] The incidence of co-morbidities related to obesity and overweight: A systematic review and meta-analysis, Guh et al, BMC Public Health 2009

[6] Estimates for England in 2014/15 are based on: Scarborough, P. (2011) The economic burden of ill health due to diet, physical inactivity, smoking, alcohol and obesity in the UK: an update to 2006–07 NHS costs. Journal of Public Health. May 2011, 1-9. These have been uplifted to take into account inflation. No adjustment has been made for slight changes in overweight and obesity rates over this period. It has been assumed England costs account for around 85% of UK costs, in accordance with UK population estimates splits between the four nations.

[7] Health Survey for England, 2016, NHS Digital

[8] Lake, J.K., Power, C., & Cole, T.J. (1997). Child to adult body mass index in the 1958 British birth cohort: associations with parental obesity. *Archives of Disease in Childhood, 77,* 376-381.

[9] Tackling Obesities: Future Choices – Project report, 2007

[10] PHE (2017) National Child Measurement Programme, Changes in children's body mass index between 2006/07 and 2015/16, available online at https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/646271/national_child_measurement_programme_changes_in_childrens_BMI_detailed_report.pdf (last accessed 23/02/18)

[11] FSA (2014) Food and You, available online at https://www.food.gov.uk/science/research-reports/ssresearch/foodandyou/food-and-you-2014-0 (last accessed 23/02/18)

the second of these channels, once consumption reaches a certain point, no further nutritional benefit is gained. When daily energy intake exceeds energy expenditure individuals will gain weight, potentially leading to obesity and the health problems this can cause.

8. Optimal market outcomes require individuals to be fully informed of the costs and benefits of consuming products. The energy content of food is key information for assessing a product's ability to deliver satiation and its potential to result in overconsumption. There is currently a clear case of information asymmetry in the out-of-home food sector – while producers of food have (to varying degrees) knowledge of the nutritional content of their food, the consumers do not.

9. This problem is compounded by the relationship between food as a provider of both nutrients and utility (through taste etc.). Where consumers can observe only the taste of a product, but not its nutritional composition, producers will naturally have an incentive to enhance the properties of the former, even if this must come at a cost to the latter. In other words, where taste may be improved through the addition of energy dense ingredients, the incentive to do so is greater when consumers are not aware of the additional health costs this imposes.

10. The provision of energy labelling for foods consumed in the out-of-home sector will allow individuals to more accurately assess the potential health costs of foods, and thus make more rational purchasing decisions after considering all characteristics of a product.

11. Another rationale for intervention is that some consumers may lack self-control when choosing a meal and fail to take into account the health impact excess calorie consumption, which often occurs later in life. Labelling and calorie information can provide a mechanism for more self-control.

12. It should be noted that individuals face only some of the costs associated with obesity, as universal healthcare ensures that the financial costs of treating ill health are faced by the taxpayer. As with any case of negative externalities, this results in a sub-optimal outcome from a societal perspective. The provision of energy labelling does not attempt to correct for this difference between individual and societal costs – merely to improve the functioning of a market operating under this constraint.

13. Government intervention is required as previous voluntary efforts to encourage the provision of energy labelling in out-of-home (OOH) settings have resulted in a low level of market coverage, which looks unlikely to increase of its own volition.

14. Under the voluntary Responsibility Deal, 45 OOH businesses signed a pledge to provide energy information at the point of choice. Based on the market share of these signatories, we estimate approximately one quarter of meals served in OOH settings carry labelling. One evaluation indicated that only 4% of signatories providing energy labelling were judged as being motivated by the Responsibility Deal. For further detail, see the 'Option 1 – do nothing' section.

15. The Responsibility Deal has since been discontinued and the food related work is being taken forward by Public Health England in their wider reformulation work.

16. International evidence from the US and parts of Australia, where energy labelling in OOH settings has been mandated and already come into effect, is mixed but on balance suggests energy labelling delivered a small but significant reduction in calories purchased by consumers who noticed and used the information. In addition, following the introduction of a voluntary OOH energy labelling scheme in 2012, the Irish Government is currently legislating to make the scheme mandatory with enactment expected in 2019/2020. Further discussion of benefits, drawing on international evidence, can be found in the 'Health Benefits' section below.

17. Our analysis (based on peer reviewed academic evidence) of mandating energy labelling in all OOH settings estimates that for every £1 of cost there will be £28 of benefits arising from a healthier population, over a 25-year period. Testing of the robustness of this conclusion can be found in the 'Critical value analysis' section.

18. A regulatory approach where all businesses fall within the scope of the regulation would result in a level playing field across the OOH sector. A voluntary approach would only deliver a level playing field if every business chose to provide energy labelling. However, the most recent voluntary approach, the Responsibility Deal, is estimated to have only resulted in one quarter of meals carrying energy labelling.

Impact on children

19. As mentioned previously, 16% of children aged 2-15 are considered obese. Furthermore, the burden of childhood obesity is being felt the hardest in more deprived areas with children growing up in low income households more than twice as likely to be obese than those in higher income households[12]. These rates are unacceptably high. Obesity in childhood affects physical and mental health and is associated with an increased risk of obesity in adulthood when most of costs due to obesity occur. Although food habits are not perfectly stable over the life course, there is considerable scope for influencing lifetime habits by intervening in children[13]. Adjusting the consumption patterns of children through providing calorie labels and raising awareness of the calorie content of meals therefore offers substantial benefits in the long term.

Policy objective, context and options

Policy objective

20. Mandating OOH energy labelling is intended to:

- Enable parents and consumers to make informed and healthier choices by providing energy information at the point of choice;
- Ensure energy information is provided in a consistent manner across all OOH settings, ensuring wider market penetration to increase consumer use, and consistent presentation of information aiding understanding;
- Encourage caterers to reformulate high calorie products and provide healthier options;
- Create a level playing field across the catering industry, removing disincentives for OOH businesses with a high proportion of energy dense products not to provide energy labelling;
- Recognise and address the importance of the OOH sector to overall food consumption, and assist the wider obesity strategy to reduce circumstances currently contributing to the obesogenic environment.

Policy context

Obesity and eating out

21. The proposal to mandate energy labelling in the OOH sector is part of a wider set of policies included in the Government's Childhood obesity: a plan for action – chapter 2, published in June 2018. The plan sets out the Government's national ambition to halve childhood obesity by 2030 and significantly reduce the gap in obesity prevalence between children from the most and least deprived areas[14]. The proposals outlined in chapter 2 include consulting on ending the sales of energy drinks to children, encouraging further action in local areas and further restrictions on the marketing of HFSS (high sugar, salt, and fat) products to children. The proposed policies will help parents make the best decisions for their families by changing the food environment, so that healthier choices become the easiest choices.

22. In August 2016, the Government launched the first part of its plan for action[15]. This comprehensive plan aims to help children and families make healthier choices and be more active[16]. Key measures in the plan included a Soft Drinks Industry Levy (SDIL), a sugar and calorie reduction programme,

[12] NHS Digital. (2017). National Child Measurement Programme 2016/17

[13] Hursti UK. Factors influencing children's food choice. Annals of medicine. 1999 Jan 1;31(sup1):26-32.

[14] Childhood obesity: a plan for action, chapter 2 https://www.gov.uk/government/publications/childhood-obesity-a-plan-for-action-chapter-2 (last accessed 06/08/2018)

[15] Childhood obesity: a plan for action is available at: www.gov.uk/government/uploads/system/uploads/attachment_data/file/546588/Childhood_obesity_2016__2__acc.pdf (last accessed 06/08/2018)

[16] Ibid.

and a commitment to helping children enjoy an hour of physical activity every day. Chapter 2 builds on the first chapter of the plan, both to cement the action already taken, and to take action in other areas.

23. The SDIL has been designed to incentivise reformulation and is charged on drinks with a total sugar content of 5 grams or more per 100 millilitres. There is a higher charge for drinks that contain 8 grams or more sugar per 100 millilitres. The levy came into force in April 2018 and has already resulted in over 50% of manufacturers reducing the sugar content of their drinks, equivalent to 45 million kilogrammes of sugar every year[17].

24. As part of the wider nutrient reformulation programme, in August 2017 Public Health England announced an extensive calorie reduction programme. This programme aims to remove excess calories from the foods children eat most, helping to make the healthy choice the easy choice for consumers. The calorie reduction programme challenges the food industry to achieve a 20% reduction in calories by 2024 in product categories that contribute significantly to children's calorie intakes and where there is scope for substantial reformulation and/or portion size reduction. This requires work to be undertaken by retailers and manufacturers, restaurants, pubs, cafes, takeaway and delivery services and others in the eating out-of-home sector. The products covered by the programme include ready meals, pizzas, meat products, savoury snacks, sauces and dressings, prepared sandwiches and other "on the go" foods. It does not cover foods included in the sugar reduction programme. An additional mechanism for action is provided through shifting consumer purchasing towards lower calorie options.[18]

25. A range of policies are being proposed because the *'causes of obesity are embedded in an extremely complex biological system, set within an equally complex societal framework'*[19] to which there is no single, simple solution. The diverse policies are intended to tackle a range of contributory factors to obesity across a range of population groups, and when combined are hoped to reduce the 'normalisation' of obesity and help people navigate the 'obesogenic environment'.

26. The size of the problem has led to its normalisation and the inability of many people to judge their own weight accurately.[20] Furthermore, evidence suggests that 50% of parents underestimate their overweight/obese child's weight.[21]

27. We know that a significant proportion of the food people eat is consumed outside of the home; recent surveys tell us that 96% of people eat out, and 43% do so at least once or twice a week.[22] People are also eating out more often; in 2014, 75% of people said they had eaten out or bought takeaway food in the past week, compared to 69% in 2010[23]. In March 2017, Cancer Research UK reported that the UK population consumes more than a 100 million takeaways and ready-made meals in a week.[24] All this means that about one in six (18%) meals are now eaten outside the home.[25]

28. Evidence suggests that eating out is one contributor to the excess energy intake that leads to overweight and obesity; studies from the US suggest that people dining out consume around 200 more calories per day than when eating at home.[26] It is clear, then, that looking at how to reduce the

[17] HM Treasury (2018) Soft Drinks Industry Levy comes into effect https://www.gov.uk/government/news/soft-drinks-industry-levy-comes-into-effect (last accessed 29/06/2018)

[18] PHE (2018) Calorie reduction: The scope and ambition for action. Available at: https://www.gov.uk/government/publications/calorie-reduction-the-scope-and-ambition-for-action (Accessed 29/06/2018)

[19] Tackling Obesities: Future Choices – Project report, Government Office for Science, 2007: https://www.gov.uk/government/publications/reducing-obesity-future-choices (Accessed 15/06/2018)

[20] Do weight perceptions among obese adults in Great Britain match clinical definitions? Analysis of cross-sectional surveys from 2007 and 2012, Johnson et al, BMJ Open 2014

[21] Lundahl, Kidwell and Nelson (2014) Parental underestimates of child weight: a meta-analysis. Pediatrics 014;133:e689–703.

[22] FSA Food and You Survey (2017) https://www.food.gov.uk/sites/default/files/media/document/food-and-you-w4-combined-report_0.pdf

[23] FSA Food and You Survey (2010 and 2014) https://www.food.gov.uk/sites/default/files/food-and-you-2010-main-report.pdf, https://www.food.gov.uk/sites/default/files/media/document/food-and-you-2014-uk-bulletin-3_0.pdf (last accessed 06/08/2018)

[24] Cancer Research UK 'A Weighty Issue' 2017 http://www.cancerresearchuk.org/sites/default/files/a_weighty_issue.pdf (last accessed 09/05/2018)

[25] PHE (2015) Sugar reduction: the evidence for action, page 28, available online at https://www.gov.uk/government/publications/sugar-reduction-from-evidence-into-action (last accessed 09/05/2018)

[26] Nguyen and Powell (2014). The impact of restaurant consumption among US adults: effects on energy and nutrient intakes. http://www.ncbi.nlm.nih.gov/pubmed/25076113 (last accessed 09/05/2018)

amount people consume when eating food made outside the home needs to be a significant part of efforts to tackle childhood obesity.

29. In the Food and You survey, roughly three quarters of respondents said they would like to see more information displayed about how healthy different options are. Around half of respondents wanted to see this information in restaurants (52%) and takeaway outlets (48%), with around 40% wanting to see it in fast food outlets (40%), pubs (39%) and cafés and coffee shops (38%). About eight out of ten households with children (82%) said they would like to see more information on healthy options.

30. The Local Government Association (LGA), which represents more than 370 councils each of whom has a responsibility for public health in their area as set out in the Health and Social Care Act 2012, is also supportive of mandatory OOH energy labelling. In February 2016, the LGA urged pubs, restaurants, and cinema chains with 20 or more sites to display the energy content of food and drink served, so consumers and parents have a more informed choice and better understanding of the healthiness of a particular snack, meal or drink. The LGA states that food and drink with high calorie content is a factor behind obesity and the subsequent health problems it can cause, and that mandatory calorie labelling would help people become more aware of how many calories they are eating and drinking.[27]

The Responsibility Deal

31. As mentioned previously, voluntary Out-of-Home Energy (kJ/kcal) Labelling was one of the pledges included the Responsibility Deal:

> ***'We will provide energy information for food and non-alcoholic drink for our customers in out-of-home settings from 1 September 2011 in accordance with the principles for energy labelling agreed by the Responsibility Deal.'***

32. The Responsibility Deal has now been discontinued. However, the food related work is being taken forward by Public Health England (PHE) as part of its wider reformulation programme, which was set out in the Childhood Obesity Plan.

33. The intended impact of the OOH energy labelling pledge was to inform and empower people to make healthier choices more often when eating out. The pledge asked businesses who sell food in OOH settings, to provide energy information for customers on menus or menu boards. Signatories agreed to make a voluntary commitment to display energy information clearly and prominently at the point of choice, for standardised food and non-alcoholic drinks. OOH settings include restaurants, quick service restaurants, takeaways, cafes, pubs, sandwich shops & staff restaurants etc.

34. Other pledges in the Responsibility Deal related to the food and drink retail sector. As with the OOH energy labelling pledge, businesses voluntarily committed to taking the action detailed in the pledge. In general, retail sector pledges were able to achieve greater market coverage than those in the OOH sector. For instance, the manufacturers who agreed to provide front of pack nutritional labelling in retail settings, which includes four macronutrient levels as well as energy content, cover approximately two-thirds of the retail market in Great Britain in terms of volume of sales.[28] In comparison, the OOH energy labelling pledge covers only one quarter of meals served in an OOH setting.[29]

35. This is likely to be due to the differing compositions of the retail and OOH markets. A small number of major supermarkets dominate the retail sector, with the 'Big Four' retailers of Tesco, Asda, Sainsbury's, and Morrison's accounting for the majority of GB grocery sales[30]. Retailers outside of the top nine supermarkets identified by Kantar account for less than 5% of the market. With just a small number of businesses signing the pledge in the retail sector, a large section of the market could be covered.

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[27] https://www.independent.co.uk/life-style/health-and-families/health-news/pubs-and-restaurants-urged-to-display-calories-on-their-menus-by-council-leaders-10397571.html (last accessed 10/05/2018)

[28] Based on DHSC analysis of returns by Responsibility Deal signatories.

[29] At the beginning, there were 45 pledge signatories who adopted OOH energy labelling. After signing the pledge, one business had decided not to continue with the voluntary arrangement.

[30] Kantar Worldpanel (2017) https://www.kantarworldpanel.com/en/grocery-market-share/great-britain (Accessed 20/11/2017)

36. In contrast, the OOH market is less dominated by the top caterers and chains, with 42% of turnover coming from small and micro businesses. As a result, voluntary approaches to the OOH sector require a much larger number of signatories to achieve similar market coverage.

Aligning the retail and catering sectors

37. Trade associations and businesses have also suggested that they would prefer a level playing field between the retail and OOH sectors.

38. Proposals to mandate energy labelling in the OOH sector are the start of work to bring caterers more in line with retailers. Energy (kJ/kcal) information is already provided on most food packaging in the UK in the back of pack nutrition labels. In contrast, there are currently no regulations on nutritional labelling at the point of purchase in OOH settings, although any labelling provided voluntarily should follow the Food Information to Consumers (FIC) format.

39. Surveys indicate that consumers know how to use front of pack labelling and find this useful when making retail purchases. Retailers are likely to strongly support mandatory OOH energy labelling as this will encourage a level playing field between the OOH and retail sectors. Businesses in the retail sector have also provided evidence suggesting that front of pack labelling has driven reformulation of existing products and design of newer healthier products. Also, the Knai et. al. evaluation of the Responsibility Deal[31] references multiple natural experiments which suggest that nutritional labelling influenced industry to product reformulation to reduce salt, saturated fats, added sugars and trans fats.

International context

40. Calorie menu labelling is mandatory in the US and parts of Australia, and similar regulations were recently accepted in Ireland and Canada.

41. Since May 2018, chain restaurants in the US with 20 or more establishments are required to display energy information on menus as part of the Patient Protection and Affordable Care Act (2010).[32]

42. In Northern Ireland, Calorie Wise is a voluntary scheme that encourages businesses to display calories on menus.[33] It is targeted at small and medium sized businesses in partnership with the 11 District Councils.

43. In Ireland, a national consultation by the Food Standards Authority Ireland (FSAI) in February 2012[34] found that over 95% of consumers were in favour of calorie labels on menus in some or all food outlets. Following FSAI recommendations, voluntary calorie menu-labelling was introduced with technical guidance published for businesses.[35] Following an evaluation of a voluntary pilot Calorie Wise scheme in Northern Ireland in 2013, in response to concerns raised by small and medium sized enterprises (SMEs), the FSAI developed a free online calorie calculator tool to assist SMEs in assessing calorie content of products. MenuCal launched in 2014.[36] In February 2015, the Irish Government agreed to draft proposals to mandate calorie labelling.[37]

44. Scotland consulted on the 'A healthier future – action and ambitions on diet, activity and healthy weight' document in 2018.[38] They have been looking at a range of options to consider, including investigating the effectiveness and impact of calorie labelling approaches. They are exploring how to strengthen the current labelling arrangements and improve the way in which information reaches families.

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[31] Knai et. al., 2015. Has a public-private partnership resulted in action on healthier diets in England? An analysis of the Public Health Responsibility Deal pledges. http://www.sciencedirect.com/science/article/pii/S0306919215000391 (last accessed 06/08/2018)

[32] FDA, Menu Labelling Requirements https://www.fda.gov/Food/GuidanceRegulation/GuidanceDocumentsRegulatoryInformation/LabelingNutrition/ucm515020.htm (last accessed 06/08/2018)

[33] FSA Calorie Wise https://www.food.gov.uk/business-guidance/calorie-wise (last accessed 20/09/2018)

[34] FSAI (2012) Calories on menus in Ireland http://www.fsai.ie/WorkArea/DownloadAsset.aspx?id=11419 (last accessed 06/08/2018)

[35] FSAI (2012) Putting calories on menus in Ireland http://www.fsai.ie/WorkArea/DownloadAsset.aspx?id=11421 (last accessed 06/08/2018)

[36] Department of Health (Ireland) (2014) https://health.gov.ie/blog/press-release/minister-for-health-launches-new-online-fsai-calorie-calculator/ (last accessed 20/09/2018)

[37] Department of Health (Ireland) (2015) Government approves Heads of Bill for calorie posting on menus http://health.gov.ie/blog/press-release/government-approves-heads-of-bill-for-calorie-posting-on-menus/ (last accessed 06/08/2018)

[38] Scottish Government (2018) A healthier future- action and ambitions on diet, activity and healthy weight https://consult.gov.scot/health-and-social-care/a-healthier-future/ (last accessed 06/08/2018)

45. The Government of Ontario, Canada's largest province, passed legislation in May 2015[39] to mandate calorie labelling on menus and displays in restaurant chains and other food service providers with 20 or more outlets. This came into effect on the 1st January 2017. This followed a voluntary programme which Restaurants Canada, a trade association, originally promoted in chain restaurants in the province of British Columbia and then expanded nationally.

46. Discussion of the evidence assessing the impact of energy labelling in the US and Australia can be found in the 'Health Benefits' section with a list of the key papers considered listed in Annex C – Previous research on impact of energy labelling.

Options

47. One non-regulatory and a range of regulatory options are proposed. Non-regulatory options have been investigated but are not considered sufficient to achieve the policy objectives. The proposed options are therefore:

    - **Option 1** – Do nothing
    - **Option 2** – Mandate energy labelling (kJ and kcal per portion) for all standardised food and drink products sold in all out-of-home settings at the point of choice.
    - **Option 3** – Mandate energy labelling (kJ and kcal per portion) for all out-of-home businesses except micro businesses.
    - **Option 4** – Mandate energy labelling (kJ and kcal per portion) with a range of variations to the businesses and products in scope, or presentation of labelling and timeline for implementation.

48. A preferred option between options 2, 3 and 4 has not been chosen. This choice will be informed by the consultation exercise. However, it is helpful to point out that while micro businesses account for the clear majority of out-of-home businesses, they only account for around 22% of the sector's turnover.[40] Therefore, option 3 delivers substantial public health benefits, ensures consumers receive energy information in most of their OOH meals and avoids the risk of disproportionately burdening micro businesses.

49. The Department of Health and Social Care is committed to undertaking an evaluation of these regulations before 2023. The specifics of this evaluation will be developed following the consultation.

Option 1 – Do nothing

50. This is the do nothing scenario against which all other options are compared. Under the do nothing scenario, the Department would take no more action than we are currently undertaking with industry to secure adoption of energy labelling at the point of choice.

51. Whilst some businesses are providing energy information to consumers, this is not widespread and is not always provided at the point of choice. If left to itself, the sector is unlikely to provide energy information at the point of choice (the most influential point in the consumer decision-making process) in a consistent manner (which would aid consumer understanding and ability to compare products). It is also unlikely to achieve the level of market penetration required to ensure energy information is routinely available for consumers to make informed healthier choices.

52. 45 businesses signed the voluntary OOH energy labelling Responsibility Deal (RD) pledge. Based on the market share of these signatories, we estimate that approximately three quarters of all meals served in the OOH sector do not currently carry energy labelling.

53. A Knai et. al. evaluation[41] analysed the RD and included a specific section on the OOH pledge. It suggests that those businesses who had signed up to the RD committed to pledges they were

[39] Ontario (2015) Healthy Menu Choices Act. 2015, S.O. 2051, c.7, Sched. 1, https://www.ontario.ca/laws/statute/15h07 (last accessed 06/08/2018)

[40] Business population estimates, Department for Business, Energy and Industrial Strategy, 2017

[41] Knai et al. (2015) Has a public–private partnership resulted in action on healthier diets in England? An analysis of the Public Health Responsibility Deal food pledges http://www.sciencedirect.com/science/article/pii/S0306919215000391 (last accessed 28/11/2017)

already achieving or about to achieve. For OOH energy labelling, only 4% of signatories providing the labelling were judged as being motivated by the RD. The evaluation also acknowledged that RD interventions, if implemented fully across all businesses, would have the desired impact.

54. Due to the considerable number of uncertainties which would need to be taken into account, the do-nothing scenario in this Impact Assessment does not attempt to quantify the future impact of the policies already announced as part of the Childhood obesity: a plan for action or any other possible future actions by government. Furthermore, the interactions of implementing multiple policies at once are also not assessed under our estimates, but these effects are examined in the 'Interaction of policy effects' section.

Option 2 – Mandating energy labelling of all standardised food and drink items in all out-of-home settings at the point of choice

55. This option builds on the Responsibility Deal and would mandate the previously voluntary scheme. All guidance on the correct form and presentation of information would remain unchanged.

56. Regulation would cover all out-of-home settings including, but not limited to, restaurants, pubs, takeaways, street food, vending machines, contract caterers and public-sector locations (e.g. hospital canteens), including SMEs.

57. An additional statement of average daily energy requirement should also be displayed, e.g. "Reference intake of an average adult (8400kj/2000kcal)" or "Adults need around 8400kj/2000kcal a day". This is also known as contextual labelling and likely increases the effectiveness of the labels. Energy information would be provided per portion or consumption unit (e.g. per scoop), whatever is the most useful to the consumer. The portion or consumption unit used must be quantified. The exact labelling format will be informed by the consultation.

58. Energy information would be displayed at point of choice. Point of choice is defined to be close to the price and description or image of the product e.g. menus, menu boards, counter menus, shelf edges, menu leaflets, front of packaging (for self-service wrapped food), online (for takeaway businesses where you order online or view menus online), including for third-party sellers where menus are provided.

59. Businesses would be able to use online applications or tools (some with free access, some with subscription costs) to calculate the number of calories in menu items by inputting ingredients and quantities from the recipe. There would be no obligation for businesses to use such a tool as long as they meet the requirements of the regulation.

60. It is proposed that enforcement costs are borne by the Department of Health and Social Care. To enforce mandatory OOH energy labelling, businesses could be inspected on the presence and accuracy of their labelling, which would likely be carried out as part of pre-existing routine inspection visits of businesses conducted at Local Authority level. The consultation seeks views on the best way to enforce the policy.

61. There are likely to be various complexities in defining and implementing out-of-home labelling. Our considerations in the following assume that these are successfully overcome.

Option 3 – Mandating energy labelling of all standardised food and drink items in all out-of-home settings at the point of choice, excluding micro businesses

62. Option 3 is a variation on Option 2, exempting micro businesses (businesses with fewer than 10 employees)

63. This variation recognises that the burden of achieving compliance with the proposed regulations may be disproportionately high for micro businesses, and aims to mitigate the impact on these businesses.

64. Enforcement would be carried out in the same manner as for Option 2, with appropriate alterations for each variation.

Option 4 – Mandate energy labelling (kJ and kcal per portion) with a range of variations to the businesses and products in scope, location, or presentation of labelling and timeline for implementation

65. A range of variations to Option 2 are discussed:
    a) Exempting small and micro businesses (businesses with fewer than 50 employees);
    b) Exempting sides and extras, such as sauces;
    c) Allowing businesses flexibility in how they choose to present the information, such as choice over font size, colour, location;
    d) Extending the timeline for implementation for micro businesses from a one-year notice period to a two-year notice period.
66. Variations a) and d) of this option recognise that the burden of achieving compliance with the proposed regulations may be disproportionately high for small and micro businesses, and aim to mitigate the impact for these businesses. Variations b) and d) aim to reduce the burden for all businesses through a less prescriptive approach to products included and the precise nature of the energy labelling.
67. Enforcement would be carried out in the same manner as for Option 2, with appropriate alterations for each variation.

Current composition of the out-of-home market

68. The size of the out-of-home market is difficult to establish, with estimates varying depending on the source. This is due in part to the high level of business turnover in the catering market, and because different sources cover different sections of the eating out market.
69. We are using BEIS business population estimates from 2017 as the main data source for the number of out-of-home businesses.[42] The data provides a breakdown by number of employees as illustrated in Table 1.

Table 1: Enterprises by industry and employment size band, England only (2017)

Micro (< 10)	Small (10-49)	Medium (50-249)	Large (250+)	Total	% micro	% small or micro	% SMEs
140,965	24,060	2,495	520	**168,040**	*84%*	*98%*	*100%*

70. For the number of outlets, we are using estimates from the Food Standard Authority (FSA).[43] Since this data lacks a breakdown by number of employees, we assume that micro businesses have one outlet each, while small businesses have 1.5 outlets each. The estimated number of outlets belonging to small and micro businesses is illustrated in Table 2.

Table 2 Number of outlets in the catering sector in England (2017)

Micro (< 10)	Small (10-49)	Total	% micro	% small or micro
140,965	36,090	**376,347**	*37%*	*47%*

71. The calculations in this Impact Assessment use both the number of businesses (enterprises) and the number of outlets (local units), the choice of which depends on whether costs are most likely to fall at a business or outlet level.
72. The catering industry is characterised by large numbers of small and micro businesses (where small is defined as less than 50 employees and micro is defined as less than 10 employees), with approximately 98% of businesses being classified as small or micro.

[42] BEIS (2017) Business population estimates 2017 https://www.gov.uk/government/statistics/business-population-estimates-2017 (last accessed 10/09/18)

[43] FSA (2017) Annual report on UK local authority food law enforcement https://signin.riams.org/files/display_inline/45859/laemsannualreport201617-22012018.pdf (last accessed 10/09/18)

73. In terms of sales, small and micro businesses together comprise 42% of turnover in the *accommodation and food services* sector[44], with this equally split between small and micro businesses.

Table 3: Turnover in the 'accommodation and food services' sector in the UK by business size[45]

	Micro (< 10)	***Small (10-49)***	***Medium (50-249)***	***Large (250+)***	***Total***	***Small or micro***	***SMEs (medium, small, micro)***
Turnover (£m)	21,643	19,782	13,155	43,574	**98,154**	41,425	54,580
% of '*accommodation and food services*' turnover	*22%*	*20%*	*13%*	*44%*	***100%***	*42%*	*56%*

Figures may not sum to 100% due to rounding.

74. There were 45 signatories to the Responsibility Deal out-of-home calorie labelling pledge[46]. Of these 45 signatories, 33 had reported information on the proportion of outlets with energy labelling. Using this information, we estimate that around 26% of the market currently provides energy labelling.

1. Are you aware of any comprehensive data sources on the number of businesses and outlets in the out-of-home food market?

Costs and benefits of options

75. The main categories of impact to be considered are set out below.

76. If the policy is successful, benefits may accrue through:

- increased awareness and understanding of the energy content of their food enabling consumers to make more informed and healthier choices in OOH settings for themselves and their children;
- encouraging the OOH sector to reformulate existing products and design new products that are less energy dense;
- reduction in excess calorie consumption and obesity prevalence in children and adults;
- savings to the NHS through reduced treatment costs of obesity-related conditions such as type 2 diabetes, heart diseases and cancer;
- increased productivity and economic output;
- tackling the obesogenic environment and the normalisation of unhealthy foods.

77. The main categories of costs to be considered are:

- the costs to businesses, including familiarisation costs, costs of calculating energy values for their food and drink items, and labelling costs;
- the cost borne by Government for enforcing the regulation.

78. The net present values of the options are assessed over a period of 25 years. This is much longer than the typical 10-year assessment period used in impact assessments. Ill health related to being overweight or obese tends to develop later in life. Therefore, a longer period than usual has been chosen to ensure the benefits of these regulations are captured in our analysis.

[44] Business population estimates, Department for Business, Energy and Industrial Strategy, 2017

[45] Ibid.

[46] DH(2013) Public Health Responsibility Deal http://webarchive.nationalarchives.gov.uk/20130104155639/http://responsibilitydeal.dh.gov.uk/ (last accessed 08/12/17)

Option 1

79. Option 1 is the do nothing scenario against which all other options are compared. As such, the costs and benefits are defined to be 0.

Option 2

Costs to businesses

80. It is important to note that the costs estimated here are theoretical and not informed by any data gathering and, consequently, there will be a degree of inaccuracy. DHSC welcomes any comments on whether our estimated costs are reasonable and hope that the consultation will help us improve our understanding of the administrative burden.

81. Businesses that are already voluntarily providing energy labelling are likely to have reduced costs since the regulation will follow the voluntary guidance that already exists. This is discussed in each section below.

Familiarisation

82. We assume that, on average, it would take one manager one hour to read and become familiar with the regulations. The time taken for initial familiarisation with the scheme will vary between businesses depending on the size and scale of operations. It might be expected that larger businesses will require more familiarisation time as different managers will need to be briefed. We believe that one hour serves as a reasonable average and would welcome any further evidence on this assumption.

83. The average hourly wage rate for a *restaurant and catering establishment manager and proprietor* is £10.45, according to the 2017 Annual Survey of Hours and Earnings (ASHE)[47]. This is uprated by 30% to £13.60 to account for on-costs. We recognise that the appropriate wage rate will vary by business depending on who undertakes the initial familiarisation; the average wage rate has been used to provide our best estimate.

84. To estimate the total familiarisation costs to businesses, the uprated average hourly wage rate is multiplied by the number of businesses affected.

Table 4: Familiarisation cost by sector

	Best estimate	Lower estimate	Upper estimate
Hourly wage rate	£13.6	£10.3	£17.5
Across 168,040 businesses	£2.3m	£1.7m	£2.9m

85. To take into account some of the uncertainty surrounding wage rates, sensitivity analysis has been conducted using the maximum and minimum wage rate percentiles in ASHE. This indicates that familiarisation costs to business could range between £1.7m and £2.9m.

86. We have used the number of businesses as opposed to the number of outlets to calculate the familiarisation costs. We feel this is more appropriate since it is likely the businesses with more than one outlet will appoint one individual to read the regulations initially. We acknowledge that any further costs are more likely to be incurred per outlet and that this will affect larger businesses more than smaller businesses.

Costs of calculating energy values for food and drink products

87. To implement energy labelling, caterers will first need to assess the energy content of each of the items on their menus. To assist retailers with this assessment, various online calculator tools exist.

[47] ONS (2017) Annual Survey of Hours and Earnings , Table 14.5 https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/earningsandworkinghours/datasets/occupation4digitsoc2010ashetable14 (last accessed 17/05/2018)

10. Have those businesses currently providing energy labelling reformulated or designed new healthier products because of energy labelling?

11. What would be the cost of reformulation?

12. Are there any additional costs to businesses that have not been captured here?

13. Are the assumptions made to estimate the costs to businesses reasonable?

Costs to consumers

124. We do not expect there to be any costs to consumers of this policy. However, it is possible that businesses could choose to pass on the costs of developing energy labelling to consumers.

Costs to Government

Enforcement costs

125. To enforce mandatory OOH energy labelling, businesses would need to be inspected on the presence and accuracy of their labelling, which would likely be carried out as part of pre-existing routine inspection visits conducted by Trading Standards Officers (TSO's). We would welcome any views on the best way to enforce the policy as part of the consultation.

126. There will be one-off transition costs to Local Authorities as TSO's familiarise themselves with the new regulations. According to the national Careers Service, an experienced trading standards officer works around 37 hours per week and earns between £24k and £50k a year[56]. Using the midpoint of this range we estimate an hourly salary assuming a 37-hour working week, 5 weeks holiday and 8 days of bank holidays. Uplifting this hourly wage for 30% on cost implies the hourly cost of Trading Standards Office is £28.63. Assuming familiarisation and dissemination of information to other TSOs will take a total of three hours per Local Authority, we estimate that familiarisation costs for all 326 Local Authorities would be around £28k.

127. According to FSA data, there are around 376,000 OOH outlets in England[57]. Assuming outlets are inspected every 2 years[58] suggests there will be 188,000 visits per year. We estimate the additional time required at each outlet for paperwork-based checks to be 15 minutes per inspection. Multiplying visits by time required and the uprated hourly wage of £28.63, we estimate that total staff costs for enforcement are around £1.3m per annum.

14. What would be a good approach to enforce this policy?

15. Is it reasonable to assume that, on average, OOH businesses are inspected every two years?

128. We are consulting on what enforcement would involve, but for modelling purposes we have provided illustrative costs for conducting laboratory analysis on a sample of products to check the accuracy of labelling. Using the responses to the FSA consultation mentioned previously we assume this will cost of £30 per item. Assuming 10% of outlets are tested and three products are tested per site, we estimate that laboratory costs will amount to around £1.7m per annum.

129. Combining staff and testing costs results in total ongoing enforcement costs of £3m per annum, with a one-off familiarisation cost of £28k.

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[56] https://nationalcareersservice.direct.gov.uk/job-profiles/trading-standards-officer Accessed 06/06/2018

[57] FSA (2017) Annual report on UK local authority food law enforcement https://signin.riams.org/files/display_inline/45859/laemsannualreport201617-22012018.pdf (last accessed 10/09/18)

[58] http://www.tradingstandardswales.org.uk/help/foodinspect.cfm and http://www.hullcc.gov.uk/portal/page?_pageid=221,52448&_dad=portal&_schema=PORTAL indicate this to be a plausible assumption. Both accessed 18/01/2018.

130. If there are concerns that labels are misleading, additional costs may result from the need to spend time with the businesses to check how they have arrived at their figures or to support them in displaying accurate information. This is likely to be frontloaded to the initial years of implementation.

131. The Department of Health and Social Care would propose to reimburse local authorities for the cost of enforcing this policy and has budgeted accordingly. Where a policy is placing an additional cost on the department, it is DHSC policy to convert this into an opportunity cost. This is done by estimating the value of the health benefits this displaces from the fixed health budget.

132. At the margin, it is estimated that the NHS can purchase a Quality Adjusted Life Year (QALY) for £15,000, which in turn is then valued at £60,000 by society. Dividing the yearly enforcement costs by this figure and multiplying by society's valuation of a QALY, implies that the opportunity cost of this funding is £12.2m per annum, with the opportunity cost of the initial familiarisation costs valued at £112k.

133. Since ongoing enforcement costs are based on the number of outlets requiring inspection, any change to the total size of the OOH sector will impact on costs to local authorities. Furthermore, if businesses fail to comply with the regulation, then there may be additional sanction costs, for instance through issuing Improvement Notices. We are unable to determine the number of businesses this will be required for, and for the purposes of this analysis we assume full compliance with the regulations.

Health Benefits

134. The health benefits generated by this policy will depend on several factors, including the level of awareness, comprehension and use of energy labels by consumers. For the purposes of our calculations we have assumed full compliance, i.e. all OOH businesses meet the regulations.

135. To quantify the benefits, we have estimated an average reduction in calorie consumption per person per day. The calculations of the quantified benefits are done within the "DHSC Calorie Model". This model simulates a "control" group of would-be overweight and obese adult population, compared with an "intervention" group. The "intervention" group has a lower average BMI, as calculated from the reduced daily calorie intake. The simulation is over 25 years.

136. The average BMI determines the likelihood of the following five conditions associated with obesity, which in turn have a fatality rate and a reduced utility following survival: diabetes, coronary heart disease, stroke, colorectal cancer, and breast cancer. The savings to the NHS are calculated from the reduced treatment of each disease. Reductions in mortality are used to calculate the impact on economic output from an increased workforce. The costs of social care savings are calculated due to a reduced proportion of overweight, obese, and morbidly obese individuals and hence fewer people needing social care in the treatment scenario. Changes in QALYs are calculated from the reduced number of deaths and the reduction of people living with the diseases. These are then converted into monetised values using a conversion of how much society values a QALY. For a full description of the calculations and the set of assumptions see annex A and the DHSC Calorie Model Technical Consultation Document[59].

Evidence regarding change in calorie consumption

137. Studies investigating the impact of calorie labelling have found mixed results. Furthermore, it's important to note that the quality of some studies is questionable with many authors calling for further research to be conducted.

138. Most evidence on the impact of energy labelling comes from studies conducted in experimental settings, or is based on findings from the US where mandatory calorie labelling has already been introduced for chains with more than 20 outlets. Annex C lists the key papers considered when determining the benefits.

[59] DHSC Calorie Model Technical Consultation Document: https://www.gov.uk/government/publications/department-of-health-and-social-care-dhsc-calorie-model

139. Studies using an experimental design, where individuals were presented with different menus and asked what they would hypothetically order, showed mixed results. For instance, one study[60] found that participants whose menus carried calorie labelling ordered 52 fewer calories and consumed 96 fewer calories than participants with no labelling. However, another study[61] found no significant difference in calorie consumption, portion size, or selection of food categories.

140. In a randomised controlled experiment in Seattle[62], parents of children aged 3-6 years choosing meals from a McDonald's menu with calorie labelling selected an average of 102 fewer calories for their children. In contrast, another randomised controlled trial[63] involving children aged 6-11 years and their parents showed no significant difference in the average number of calories selected. The authors suggested that this may have been due to the high proportion of children choosing their meals without parental involvement.

141. The introduction of mandatory calorie labelling in some areas of the US has allowed us to consider the impact of labelling in practice. Of these US-based evaluations, the Dumanovsky study (2011)[64] in New York City found that 15% of customers used calorie information when making purchasing decisions. On average, customers who reported using the information purchased 106 fewer calories than those who didn't use it. After adjusting for demographics and purchase type, the calorie reduction was slightly lower at 78 calories.

142. A study in New York City (2007)[65] showed that 32% of Subway customers saw calorie information and that on average customers who reported seeing the labelling purchased 52 fewer calories than those who had not. Another US-based study[66] showed that on average 6% fewer calories were purchased by Starbucks consumers, with the reduction being sustained over the 10-month study period. This study also showed that customers consuming a higher than average number of calories experienced a greater reduction.

143. Away from New York City, a third study[67], this time comparing Philadelphia (which implemented mandatory nutrition labelling) with Baltimore (which did not) showed that on average customers of restaurants with labelling purchased 155 fewer calories (a relative difference of 9%) compared to customers of restaurants with no labelling. Customers who reported seeing and using the labelling drove the labelling effect: on average, they purchased 400 fewer calories than others (a relative difference of 20%).

144. Outside of the US, an evaluation of Australia's introduction of mandatory energy labelling in 2012 showed that the median amount of energy purchased decreased by 15% between May 2011 and January 2013[68].

145. Nikolaou et al. (2015) performed a systematic literature review and meta-analysis on this topic[69]. Their meta-analysis showed no statistically significant effect of calorie labelling. However, meals ordered by customers who did notice labels (30–60% of customers) had 125 kcal less than was the case where no labels were provided.

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[60] Hammond, D., et al., 2013. A randomized trial of calorie labeling on menus, Prev. Med. (2013), https://www.sciencedirect.com/science/article/pii/S0091743513003666 (last accessed 01/12/17)

[61] Harnack, L., French, S., Oakes, J., et al., 2008. Effects of calorie labeling and value size pricing on fast food meal choices: from an experimental trial. Int. J. Behav. Nutr. Phys. Act. 5, 63. http://www.ijbnpa.org/content/5/1/63 (Last accessed 28/11/17)

[62] Tandon PS, et al. (2010). "Nutrition Menu Labeling May Lead to Lower-Calorie Restaurant Meal Choices for Children." Pediatrics, vol. 125(2), pp. 244-248, http://pediatrics.aappublications.org/content/125/2/244.full.pdf (last accessed 20/12/2017)

[63] Tandon, P. et al., 2011. The impact of menu labelling on fast-food purchases for children and parents. Am. J. Prev. Med. 2011; 41(4), 434-438.

[64] Dumanovsky T, et al. (2011). Changes in Energy Content of Lunchtime Purchases from Fast Food Restaurants after Introduction of Calorie Labeling: Cross Sectional Customer Surveys, British Medical Journal. doi: 10.1136/bmj.d4464

[65] Bassett, M.T., Dumanovsky, T., Huang, C., et al., 2008. Purchasing behavior and calorie information at fast-food chains in New York City, 2007. Am. J. Public Health 98, 1457–1459.

[66] Bollinger B, et al. (2010). Calorie Posting in Chain Restaurants. Palo Alto, CA: Stanford University.

[67] Auchincloss, A., et al., 2013. Customer responses to mandatory menu labelling at full-service restaurants. Am. J. Prev. Med. 2013; 45(6), 710-719.

[68] Food Authority NSW, Evaluation of kilojoule menu labelling, http://foodauthority.nsw.gov.au/_Documents/scienceandtechnical/fastchoices_evaluation_report.pdf (last accessed 01/12/2017)

[69] Nikolaou, C et al., 2015, Calorie-labelling: does it impact on calorie purchase in catering outlets and the views of young adults? http://www.nature.com/articles/ijo2014162 (last accessed 13/12/2017)

146. In 2016, Hector[70] also conducted a review of studies investigating the impact of menu labelling. Evidence from 15 studies suggested that the average amount of calories ordered in real-world settings decreased by 77.8 kcal after labelling had been introduced. As hinted at above, studies usually find that there is a difference in calories purchased depending on whether the customers have seen the labelling or not. It's also important to note that some studies included in this review did not find a significant reduction in calories after labelling had been implemented.

147. Zlatevska et al (2017)[71] investigated evidence from the US by examining the effectiveness of the calorie disclosure legislation in the OOH sector. They found that calorie labelling leads to an average reduction of 27 calories per meal. Moreover, the authors found that the calorie reduction was significantly stronger for overweight individuals, females, table-service restaurants and hypothetical choice scenarios, as well as for lunch meals. In addition to a change in consumer behaviour, the authors also found that retailers responded by reducing the energy content menu of items by 15 calories on average.

148. A Cochrane review into the impact of nutritional labelling on food purchasing and consumption[72] includes a meta-analysis of three US studies. The review states that calorie labelling leads to an average reduction in calorie intake of 47 kcal per person per meal. However, the authors note that the quality of evidence for the three included studies was low and that more research would be needed to be confident in the results. Still, the review 'tentatively suggests that nutritional labelling on menus in restaurants could be used as part of a broader range of interventions to increase the impact of efforts to support healthier food consumption across populations'.

149. In contrast to the reviews noted above, Sinclair et al. (2014)[73] found no significant reduction in their review of studies that tested calorie content labels. Furthermore, three Elbel studies assessing the impact of mandatory calorie labelling (two in New York[74,75] and one in Philadelphia[76]) showed no significant change in calories purchased post-regulation. The two New York studies focused on low income and ethnic minority groups.

Choice of evidence for this impact assessment

150. As outlined above, there is a considerable amount of evidence available in this area, with various individual studies and reviews investigating the impact of calorie labelling on restaurant menus. Despite this wealth of evidence, there seems to be little consensus regarding the overall effect on calorie consumption, with some papers not finding any evidence of a change. However, three recent and extensive literature reviews have found a significant calorie reduction due to calorie labelling.

151. There is an intrinsic difficulty in designing studies with the power to identify small changes in the number of calories purchased or consumed. However, small changes are expected to add up and result in a substantial impact on obesity levels. So even if some studies find no statistically significant calorie reduction, the overall effect may still result in significant health benefits.

152. We have used the Cochrane review mentioned previously as the basis for our calculations. The advantage of this study is that it is a meta-analysis of three randomised control trials, which looked at different types of restaurants. It's important to note that the review only considers a reduction in

[70] Hector, D (2016) Effectiveness of numeric energy menu labelling and potential alternative formats and/or content: An evidence review. Prepared for the Working Group to the Reference Group for Fast Choices Menu Labelling in New South Wales; under the auspices of the Centre for Population Health, NSW Ministry of Health; Physical Activity Nutrition & Obesity Research Group; Sydney, https://ses.library.usyd.edu.au/bitstream/2123/17008/1/ML%20review_Nov%202016_for%20PRC%20website.pdf (last accessed 12/12/2017)

[71] Zlatevska, Neumann, and Dubelaar (2017), Mandatory calorie disclosure: A comprehensive analysis of its effect on consumers and retailers, Journal of Retailing, online available at https://www.uts.edu.au/about/uts-business-school/marketing/news/calorie-counts-menus-make-difference (last accessed 19/12/2017)

[72] Crockett RA, King SE, Marteau TM, Prevost AT, Bignardi G, Roberts NW, Stubbs B, Hollands GJ, Jebb SA. Nutritional labelling for healthier food or non-alcoholic drink purchasing and consumption. Cochrane Database of Systematic Reviews 2011 , Issue 9 . Art. No.: CD009315. DOI: 10.1002/14651858.CD009315

[73] Sinclair, Susan E., Marcia Cooper, and Elizabeth D. Mansfield. "The influence of menu labeling on calories selected or consumed: a systematic review and meta-analysis." Journal of the Academy of Nutrition and Dietetics 114, no. 9 (2014): 1375-1388.

[74] Elbel, B., Kersh, R., Brescoll, B.L., Dixon, L.B., 2009. Calorie labeling and food choices: a first look at the effects on low-income people in New York City. Health Aff. 28, w1110–w1121.

[75] Elbel, B., Gyamfi, J., Kersh, R., 2011. Child and adolescent fast-food choice and the influence of calorie labelling: a natural experiment. Int. J. Obes. 35, 493–500.

[76] Elbel B., et al., 2013. Calorie labelling, fast food purchasing and restaurant visits. Obesity 2013; 21 (11), 2172-2179.

calorie intake and doesn't take into account reductions in fat or saturated fat. Therefore, the potential benefits may be different, with reduced consumption of those nutrients also having health benefits.

153. However, since the Cochrane review is based on studies from the US, we recognise that purchasing patterns and consumers responses to labelling may be different from England. Furthermore, one study considered in the review looked at workplace lunch orders, where we would expect consumers to pay more attention to the nutrient content of their meal than in other settings. Consumers reaction towards labels also depends on their education (here students and employees of a health care company) and other factors, e.g. on whether alcohol is consumed with the meal. Furthermore, the three studies are relatively short-term observations (2-19 weeks). Long-term changes in behaviour are possible and may not have been picked up by the studies.

154. Consequently, we have decided to scale down the Cochrane results by 50%. This accounts for all the uncertainties mentioned above. As mentioned previously, the Cochrane review finds that 47 fewer calories are purchased due to labelling. Reducing it by 50% leaves us with a calorie reduction of 24 kcals per meal consumed out-of-home.

Modelled impact of reduction in calorie consumption

155. Assuming one in six meals are eaten out (0.5 meals are eaten out per day) and applying this to our calorie reduction assumption, we estimate that the average reduction in calorie consumption for all consumers is 12 kcal per day. As a quarter of meals eaten out in the UK are of products where energy labelling is already supplied, the average additional reduction in calorie consumption is estimated to be 9 kcal per person per day[77].

156. The calculations of the quantified benefits are done within the "DHSC Calorie Model". This model simulates a "control" group of would-be overweight and obese adult population, compared with an "intervention" group. The "intervention" group has a lower average BMI, as calculated from the reduced daily calorie intake. The simulation is over 25 years. For a full description of the calculations and the set of assumptions see annex A and the DHSC Calorie Model Technical Consultation Document published alongside this document[78].

157. Over 25 years, discounted health benefits through reduced mortality and morbidity are estimated at around 75,000 QALYs, or a present value of £3.4bn at £60,000 per QALY. Lower levels of morbidity would also result in reduced cost pressures to the NHS. There would be additional health benefits to the population from reinvesting these savings back into the NHS; these are estimated to be worth around £2.4bn over 25 years[79]. Social care savings would amount to £490m and reduced premature mortality would be expected to deliver an additional £80m of economic output through additional labour force participation. All savings presented are on an England only basis.

158. These estimates are based on calorie labelling alone and do not consider the fact that contextual labelling increases the positive effect of the policy or businesses may reformulate their products. These additional benefits are calculated in the sections below.

159. The reduction in calorie consumption is based solely on the reduction in calories purchased at the specific eating occasion where consumers do (or do not) read and utilise energy labelling. It is possible that there will be a further impact on calories consumed during the rest of the day, as consumers may reduce their calorie consumption at later meals in response to noticing OOH energy labelling at an earlier meal.

160. It is also possible that there will be additional long-term effects resulting from consumers' nutritional knowledge improving as their use of energy labelling information becomes more prevalent.

Compensating behaviour

[77] We have calculated the calorie reduction across all age groups as this is in line with the literature. Zlatevska et al. (2017) have found that calorie labelling doesn't have a different effect on children compared to adults.

[78] DHSC Calorie Model Technical Consultation Document: https://www.gov.uk/government/publications/department-of-health-and-social-care-dhsc-calorie-model

[79] To calculate the additional health benefits to the population from reinvesting savings back into the NHS we adjust the estimates produced by the modelling process outlined in Annex A – DHSC Calorie Model. At the margin, it is estimated that the NHS can purchase a QALY for £15,000, which in turn is then valued at £60,000 by society. Therefore, dividing the yearly NHS savings by this figure and multiplying by society's valuation of a QALY allows us to estimate additional health benefits these savings generate.

161. So far, the health benefits have been calculated on the basis that wider factors do not shift to partially or wholly offset the impact of the policy. It is possible, for example, that consumers might adjust their consumption or purchasing behaviour in response to consuming fewer calories.

162. The evidence of calorie compensation in the literature is mixed. Several experiments investigating the impact of adjusting the energy density of specific meals have found no evidence of calorie compensation at subsequent meals or during the short time period covered by the study[80]. In contrast, other investigations have found that subjects completely compensated for a change in calorie intake[81]. Furthermore, two other studies have found imprecise levels of calorie compensation, with subjects adjusting their food intake to compensate for 40% and 35% of the calories removed from their diets[82].

163. The rate of compensation is also likely to depend on the foods that are removed from people's diets, with some evidence suggesting individuals are less likely to compensate for changes in calorie intake from beverages than solid food[83]. Moreover, with many of these studies taking place in laboratory conditions or over relatively short periods of time it is unclear how people might adjust their behaviour over time in real world conditions.

164. The limited evidence available for the effects of calorie labelling only considers the impact of the policy on a specific purchasing environment and at a specific purchasing incident. It is not possible to say conclusively that behaviour does not adjust in other areas. However, two studies[84,85] have found that calorie labelling does lead to BMI reduction, with varying effects for different subgroups. This research points towards less than full compensation taking place.

165. Furthermore, it seems unlikely that individuals would compensate for consuming fewer calories after making a conscious decision to choose a healthier option. Because we can't be certain whether compensation will take place, we have decided not to adjust our estimates above. However, to capture the importance of this uncertainty in determining the NPV, we considered what proportion of the above benefits would need to be offset for the policy to impose a net cost to society.

16. Is there any further evidence on the level of compensation likely to take place?

Impact of contextual labelling

166. In addition to calorie labels, we propose to also mandate the provision of contextual labelling, i.e. including the recommended daily calorie intake for an adult woman. According to the available evidence, including contextual labelling with increase the effectiveness of the policy.

167. Roberto et al. (2010)[86] compared the food choices and intakes of groups that chose their meal from menus with calorie labels, with both calorie and contextual labels or without either. Participants in the contextual labelling group consumed fewer calories during and after the study than those who were provided with calorie labels or no labels at all.

[80] Anton, SD, et al. (2010) Effects of stevia, aspartame, and sucrose on food intake, satiety, and postprandial glucose and insulin levels. Appetite. 2010 Aug 31;55(1):37-43; Rolls, BJ,et al. (2006) Reductions in portion size and energy density of foods are additive and lead to sustained decreases in energy intake. The American journal of clinical nutrition. 2006 Jan 1;83(1):11-7; Kelly, M. et al (2009). Increased portion size leads to a sustained increase in energy intake over 4 d in normal-weight and overweight men and women. British journal of nutrition. 2009 Feb;102(3):470-7.

[81] Foltin, RW et al. (1988) Compensation for caloric dilution in humans given unrestricted access to food in a residential laboratory. Appetite. 1988 Feb 29;10(1):13-24: Foltin, RW et al. (1990) Caloric compensation for lunches varying in fat and carbohydrate content by humans in a residential laboratory. The American journal of clinical nutrition. 1990 Dec 1;52(6):969-80.

[82] Porikos KP, et al (1982) Caloric regulation in normal-weight men maintained on a palatable diet of conventional foods. Physiology & behavior. 1982 Aug 31;29(2):293-300; Kendall A, et al (1991) Weight loss on a low-fat diet: consequence of the imprecision of the control of food intake in humans. The American journal of clinical nutrition. 1991 May 1;53(5):1124-9.

[83] Mourao DM, et al. (2007) Effects of food form on appetite and energy intake in lean and obese young adults. International journal of obesity. 2007 Nov 1;31(11):1688-95.

[84] Restrepo B. (2014) https://www.ncbi.nlm.nih.gov/pubmed/27451966

[85] Variyam JN, Cawley J. (2006) Nutrition labels and obesity. National Bureau of Economic Research.

[86] Roberto et al. (2009) Evaluating the impact of menu labelling on food choices and intakes https://ajph.aphapublications.org/doi/abs/10.2105/AJPH.2009.160226?journalCode=ajph (last accessed 06/08/2018)

168. A study in Canada investigating the impact of calorie labelling and consumers preferences found that people preferred calorie labels that included contextual information, which increased their ability to understand and use the labels and decreased the number of calories they purchased[87].

169. Likewise, a study among young adults in Canada (2016)[88] found that a higher percentage of respondents could correctly recall the number of calories in pre-packaged food when given contextual labels compared to calorie labels alone. Notably, the same study concluded that, in general, people can recall the calorie content better when the label doesn't contain too much additional information. Additional information may distract attention away from the calorie number, because it might be unfamiliar and hard to grasp in the short period when people are looking at the label.

170. Another study[89] also finds that contextual labels can lead to lower calorie purchases. However, the calorie reduction may not differ relative to calorie labels alone. The authors stress that there is only limited data available and therefore caution must be taken with the findings.

171. Several studies have stressed that simplicity of labels is key and leads to a higher uptake among obese, overweight and lower socioeconomic groups[90]. Bleich et al (2017)[91] conclude that "making calorie information easier to understand and more accessible to a greater range of individuals, particularly those with lower numeracy levels, would increase the reach and impact of such information".

172. As outlined above, the available evidence suggests that contextual labelling in general is more effective than simply providing calorie information. As a result, we assume that contextual labelling leads to a 20% increase in the calorie reduction, a further 10% additional reduction in calories consumed by obese and overweight consumers and a 10% increase in uptake by obese and overweight consumers. This results in a reduction of 28kcal (instead of 24kcal) per meal, which translates into a reduction of 13 kcal per person per day.

173. Over 25 years, reducing individual's calorie intakes by 13kcal per day would result in discounted health benefits through reduced mortality and morbidity of 109,000 QALYs, or a present value of £5bn at £60,000 per QALY. Reduced morbidity would also result in reduced cost pressures to the NHS. There would be additional health benefits to the population from reinvesting these savings back into the NHS; these are estimated to be worth around £3.5bn over 25 years. Social care savings would amount to £700m and reduced premature mortality would be expected to deliver an additional £120m of economic output through additional labour force participation.

174. According to our analysis, contextual labelling is substantially more effective than calorie labelling alone. However, all the assumptions are subject to uncertainty due to a lack of strong evidence of the effectiveness of different label formats. Nevertheless, we believe that not considering the additional benefits due to contextual labelling would result in a severe underestimate, with none of the studies in the Cochrane review considering interventions with contextual information.

17. Is there any further evidence on the effects of contextual labelling?

Impact of reformulation

175. As mentioned previously, labelling will likely encourage businesses to reformulate their products, reducing the calorie content of meals and driving the creation of new heathier options. This would lead to further indirect health benefits for consumers.

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87 Pang & Hammond (2013) Efficacy and Consumer Preferences for Different Approaches to Calorie Labeling on Menus, Hournal of Nutrition Education and Bahavior, https://www.deepdyve.com/lp/elsevier/efficacy-and-consumer-preferences-for-different-approaches-to-calorie-0LKRwIhV0z (last accessed 06/08/2018)

88 Acton et al. (2016) The efficacy of calorie labelling formats on pre-packaged foods: An experimental study among adolescents and young adults in Canada http://journal.cpha.ca/index.php/cjph/article/view/5513/3447 (last accessed 06/08/2018)

89 Bleich et al. (2017a) A Systematic Review of Calorie Labeling and Modified Calorie Labeling Interventions: Impact on Consumer and Restaurant Behavior (https://onlinelibrary.wiley.com/doi/full/10.1002/oby.21940 (last accessed 06/08/2018)

90 Eric M. VanEpps, Julie S. Downs, and George Loewenstein (2016) Calorie Label Formats: Using Numeric and Traffic Light Calorie Labels to Reduce Lunch Calories. Journal of Public Policy & Marketing: Spring 2016, Vol. 35, No. 1, pp. 26-36.; van Kleef E, van Trijp H, Paeps Fet al.(2008) Consumer preferences for front-of-pack calories labelling. Public Health Nutr11, 203–213

91 Bleich et al. (2017a) A Systematic Review of Calorie Labeling and Modified Calorie Labeling Interventions: Impact on Consumer and Restaurant Behavior (https://onlinelibrary.wiley.com/doi/full/10.1002/oby.21940 (last accessed 06/08/2018)

176. Even though a minority of people currently pay attention to energy labelling, they are a big enough group to influence the market. Evidence from studies in the US[92,93] show that labelling has influenced businesses to reduce the calorie content of meals and encourage the creation of new healthier products.

177. Zlatevska et al. (2018) conducted a meta-analysis of studies investigating retailers' response after calorie labelling had been introduced. The authors found that, on average, retailers reduced the calorie content of menu items by 15kcal. The results from this study are used in the calculations below to estimate the further health benefits from reformulation.

178. Caution is necessary when estimating the benefits of reformulation due to the difficulty in judging whether it is in direct response to energy labelling or influenced by other drivers. To account for the uncertainty we have weighted the calorie reduction estimated Zlatevska down by 50%, resulting in a reduction of 7.5kcal per meal.

179. We assume that 26% of businesses already use labelling and would therefore presumably already have reformulated their products if they deem it necessary. Therefore, the remaining 74% of meals would be subject to potential reformulation, with an estimated 0.5 meals being eaten OOH per day. Using these values, we estimate a further calorie reduction of 2.8 kcal per person per day because of reformulation.

180. The calorie reduction results in health benefits of approximately £2bn across 25 years as illustrated in Table 7 below.

Table 7: Health benefits due to reformulation

Category	**Benefits**
QALYs	24,000
Health benefits (monetised QALYs)	£1,116m
NHS savings	£784m
Social care savings	£158m
Economic output	£27m
Total	**£2,085m**

Adjusting for compensating behaviour

181. As mentioned previously, it is possible that consumers might adjust their consumption in response to consuming fewer calories. Reformulation may also lead to consumers buying and consuming more of the reformulated products, thus reducing or even reversing the reduction.

182. In contrast to the benefits discussed previously, reformulation does not require a conscious decision to be made by consumers, i.e. they can continue choosing the same menu items as before but benefit from reformulation lowering calorie content of those items. As a result, it seems possible that consumers might subconsciously adjust their intakes to compensate for consuming fewer calories either during the same or subsequent meals.

183. As discussed previously, experiments investigating the impact of adjusting the energy density of specific meals have found mixed results. Due to the considerable amount of uncertainty surrounding compensating behaviour, we have decided to calculate low, central and high benefit scenarios based on different levels of compensation for the additional benefits resulting from reformulation.

184. Our high NPV scenario assumes that consumers do not alter their behaviour over time. The central and low scenarios assume behaviour adjusts to compensate for 0% and 100% of the calories removed from their diets, the central scenario assumes 40% of compensation taking place.

[92] Bruemmer, B et. al (2012). Energy, saturated fat, and sodium were lower in entrées at chain restaurants at 18 months compared with 6 months following the implementation of mandatory menu labeling regulation in King County, Washington. http://www.ncbi.nlm.nih.gov/pubmed/22704898 (last accessed 28/11/2017)

[93] McKinsey Global Institute (2014) Overcoming obesity: An initial economic analysis http://www.mckinsey.com/~/media/McKinsey/Business%20Functions/Economic%20Studies%20TEMP/Our%20Insights/How%20the%20world%20could%20better%20fight%20obesity/MGI_Overcoming_obesity_Full_report.ashx (last accessed 06/08/2018)

185. We expect the additional benefits from reformulation to fall in proportion with the level of compensation. The compensation adjusted benefit figures are presented below in Table 8.

Table 8: Calorie compensation adjusted benefit figures over 25 years (£m)

Benefit	**Scenarios**		
	Low (100% compensation)	Central (40% compensation)	High (0% compensation)
Monetised health benefit (£m)	0	670	1,116
NHS savings (£m)	0	470	784
Social care savings (£m)	0	95	158
Economic output (£m)	0	16	27
Total benefits (£m)	0	1,251	2,085

Summary of benefits

186. The expected benefits from introducing calorie labels with contextual information and the reformulation this encourages are summarised in Table 9.

Table 9: Option 2: Summary of benefits

Category	**Benefits**	
	Due to labelling	Due to reformulation
Health benefits (monetised QALYs) (£m)	5,000	670
NHS savings (£m)	3,500	470
Social care savings (£m)	700	95
Economic output (£m)	120	16
Total (£m)	**10,570**	

Summary of costs and benefits

187. The table below presents Net Present Values for different aspects of the policy, as estimated over a 25-year assessment period, on an England only basis. Again, it is important to note that the long-term health benefits require the direct impacts of the policy intervention not to be offset.

188. As outlined previously, for our central estimate (presented in the table below) we assume a 40% compensation by consumers for those benefits occurring due to reformulation. We have considered higher and lower levels of compensation (100% and 0%) in Table 8 above and in the sensitivity analysis.

Table 10: Costs and benefits – Option 2

Group affected	**Impact**	**Present Value (£m)**
OOH businesses	Familiarisation with regulations	-2
	Product assessment tool	-230
	Initial calculation of energy content of products	-15
	Calculating energy content of new or reformulated products	-85
	Initial labelling and write off costs	-20
	Re-labelling costs	Unquantified
	Change in profits	Unquantified
	Total OOH business impact	**-350**
Wider society	Health benefits	5,670
	Economic output	135
	Total societal impact	**5,805**
Government	Familiarisation with regulations	- 0.1
	Enforcement	-280
	NHS savings	3,970
	Social care savings	795
	Total Government impact	**4,485**
	NPV	**9,940**

Option 3 (Exempting micro businesses)

189. Micro businesses comprise 84% of the total number of businesses in the OOH sector in the UK, but only 22% of sales. Exempting micro businesses reduces the number of businesses covered by the regulation to around 27,000 businesses.

190. We have used the same calculations and assumptions as in Option 2 but applied them to the reduced number of businesses to calculate the cost of Option 3.

Costs to businesses

Familiarisation

191. The familiarisation costs to business are estimated to be £370,000.

Table 11: Familiarisation cost by sector

No. of businesses excluding micro businesses	Familiarisation costs (£ '000s)		
	Best estimate	Lower estimate	Upper estimate
27,075	368	278	473

192. As before, we have performed sensitivity analysis by varying the wage rate. This suggests the familiarisation costs may range from £280k to £470k.

Costs of calculating energy values for food and drink products

193. The use of a calorie calculator tool comes in at the same cost as under Option 2. This is because we previously assumed micro businesses would choose a free tool or method to calculate the calorie content of their products. Therefore, these costs are still estimated to be £13.5m.

194. We estimate the one-off transition costs incurred through calculating energy values for products sold to be £2.1m as detailed in Table 12 below.

Table 12: Transition costs of calculating energy values for food and drink products

No. of businesses excluding micro businesses	No. of menu items per business	Time per business (hours)	Cost per business (£)	Cost for all businesses (£ '000s)
27,075	50	5.8	79	2,146

195. Further costs arise from sharing this information with individual outlets. Using the same assumptions outlined in Option 2, this is estimated to cost an additional £3.2m. Bringing the total cost to around £5.3m.

196. As caterers change their offer, energy values will need to be calculated for new products. These costs are estimated to be £322k per annum as detailed in Table 13 below. Including sharing the information with outlets, the cost comes to approximately £3.5m. This is our central estimate with sensitivity analysis showing the annual costs may vary between £3.4m to £3.7m per annum.

Table 13: Annual ongoing costs of calculating energy values for new food and drink products

No. of businesses excluding micro businesses	No. of new menu items per year per business	Time per business (hours)	Cost per business (£)	Cost for all businesses (£ '000s)
27,075	8	1	12	322

Labelling and other associated costs

197. In Option 2 we estimated the cost of designing a new menu for all businesses and the printing costs just for micro businesses, this is because we anticipated these businesses would not be able

to re-label as part of their normal cycles. For this option, as there are no micro businesses, there will be no printing costs, although the design cost will still apply.

198. We have estimated the total labelling cost to business to be £2.7m. The sensitivity analysis suggests theses costs could vary between £1.4m and £4.1m. As before, this is a one-off transition cost and after the initial transition, re-labelling is expected to take place during normal re-labelling cycles.

Impact on profits

199. As discussed in Option 2, we are unable to determine the impact calorie labelling will have on profits.

Costs to Government

Enforcement costs

200. The one-off familiarisation costs remain unchanged from Option 2 at £28k.

201. Using the same calculations and assumptions as in Option 2, but applying them to the reduced number of outlets (there are 235,000 outlets excluding micro outlets) results in estimated enforcement costs of £1.9m per annum, of which £0.8m arises from staff costs and £1.1m arises from laboratory analysis of products.

202. The Department of Health and Social Care would propose to reimburse local authorities for the cost of enforcing this policy and has budgeted accordingly. Where a policy is placing an additional cost on the department, it is DHSC policy to convert this into an opportunity cost. Using the same methodology as outlined previously, implies that the opportunity cost of this funding is £7.6m per annum, with the opportunity cost of the initial familiarisation costs valued at £112k.

203. In the sensitivity analysis, our calculations suggest these enforcement costs may vary from £1.1m to £39.3m per annum.

Benefits

204. We have estimated the benefits using the same methodology and assumptions as in Option 2. As before, the average reduction in calorie consumption for all consumers would be 12 kcal per day (24 kcal according to the down weighted Cochrane estimate multiplied by 0.5 meals eaten OOH per day).

205. Since energy labelling is already in place for a quarter of meals eaten out in the UK, and a further 22% of meals are purchased from micro businesses which are exempt, the proportion of meals affected by the new regulations is 52%. This implies an estimated average reduction in calorie consumption of 6 kcal per person per day.

206. Because contextual labelling is more effective, we expect the benefits are higher. An extra 20% average calorie reduction per meal and a 10% higher uptake and 10% higher calorie reduction by overweight and obese consumers result in an average reduction of 9 kcals per person per day.

207. Using the same model as in Option 2, an estimated reduction in calorie consumption of 9 kcal per person per day resulted in discounted health benefits through reduced mortality and morbidity of 79,000 QALYs with a present value of £3.5bn over 25 years when monetised. Reduced morbidity would also result in reduced cost pressures to the NHS. There would be additional health benefits to the population from reinvesting these savings back into the NHS; these are estimated to be worth around £2.4bn over the 25-year assessment period. Social care savings would amount to £490m and reduced premature mortality would be expected to deliver an additional £80m of economic output through additional labour force participation.

208. Reformulation leads to additional benefits worth 17,000 QALYs or £460m when monetised. There are also an extra £320m worth of health benefits from reinvesting savings back into the NHS. The extra social care savings and economic benefits are estimated to be worth £70m and £10m respectively (all estimates include a 40% reduction for compensating behaviour).

Table 14: Option 3: Summary of benefits

Category	**Benefits across all businesses, excluding micro**	
	Due to labelling	Due to reformulation
Health benefits (monetised QALYs) (£m)	3,500	460
NHS savings (£m)	2,4300	320
Social care savings (£m)	490	70
Economic output (£m)	80	10
Total benefits (£m)	7,360*	

* Difference in sum due to rounding

Summary of costs and benefits

209. The table below presents Net Present Values for different aspects of the policy, as estimated over a 25-year assessment period, on an England only basis. For our central estimate (presented in the table below) we assume 40% compensation by consumers for those reduced calories/benefits due to reformulation. We have considered a higher and lower compensation (100% and 0%) in the calculations above and the sensitivity analysis.

Table 15 Costs and benefits – Option 3

Group affected	**Impact**	**Present Value (£m)**
OOH businesses	Familiarisation with regulations	-0.4
	Product assessment tool	-230
	Initial calculation of energy content of products	-5
	Calculating energy content of new or reformulated products	-55
	Initial labelling costs	-3
	Ongoing re-labelling costs	unquantified
	Change in profits	unquantified
	Total OOH business impact	**- 295**
Wider society	Health benefits	3,960
	Economic output	90
	Total societal impact	**4,055**
Government	Familiarisation with regulations	- 0.1
	Enforcement	- 175
	NHS savings	2,755
	Social care savings	555
	Total Government impact	**3,135**
NPV		**6,890**

Option 4

210. In this section we consider several alternative options: Relaxing requirements around which businesses and products are within scope of the regulation, not requiring labelling at the point of choice (menus) and allowing labelling on separate leaflets or boards instead, allowing businesses to vary the presentation of the energy information, and relaxing the notice period from one to two years for small and micro businesses. We have assessed each option separately below.

a) Exempting small and micro businesses

211. A further alternative would be to exempt small and micro businesses. Together, small and micro businesses comprise 98% of all businesses in the OOH sector but account for just 42% of turnover. Removing small and micro businesses would reduce the number of businesses in scope to around 3,015 and the number of outlets to around 199,000.

212. Using the same calculations and assumptions as previously we estimate that the:

- average reduction in calorie consumption would be 5.3 kcal per person per day and an additional reduction of 1.2 kcal due to reformulation;
- total business impact would be -£75m;
- total societal impact would be £2.7bn;
- total Government impact would be £2.0m;

resulting in an estimated NPV of £4.6bn.

b) Exempting sides and extras

213. There is wide disparity in the treatment of sides, sauces and other extras on menus. Some businesses include all accompaniments as part of the main meal, in terms of description, price, and positioning on the menu; others list each constituent part separately.

214. We have been unable to find evidence on the proportion of products labelled as sides and extras, so we are unable to estimate the costs to business. However, it seems reasonable to assume that exempting these items would lower the costs to business because they would need to assess fewer products.

215. To assess the comparative impact of providing energy labelling for main meals but not sides, we would need to know the number of products that would carry labelling. We have been unable to find evidence to this effect and therefore it has not been possible to calculate the benefits of this option. However, it seems likely that not providing calorie information for these items would limit consumers ability to choose healthier sides. Thereby reducing the benefits of the policy.

c) Allowing businesses to choose how to present the energy information

216. Allowing a non-standardised format for presenting the energy information would allow businesses more flexibility when designing menus, possibly reducing labelling costs.

217. Interviews conducted as part of the 2009 FSA evaluation of voluntary calorie labelling[94] suggests that calorie information must stand out to enhance usability. Energy values should appear large, but relative to the body text, and should appear in a contrasting colour to the background and price. The evaluation suggested that consumer preferences regarding positioning was mixed. Some preferred energy information next to the name of the food, as the eye naturally follows text from left to right. Calorie information next to the price was preferable to some, as it emphasises the equal importance of price and energy content, but others felt positioning two numbers together may lead to confusion.

218. Also, Navigator Research (2009) reported a “plea for standardisation” from respondents who wanted one scheme across all OOH settings. It was felt that this would facilitate ease of use and confer credibility on, and comparability between, different outlets.

[94] FSA (2009) Evaluation of calorie information provided in catering outlets http://webarchive.nationalarchives.gov.uk/20100929103803/http://www.food.gov.uk/science/socsci/ssres/nutritionss/evalcalinfocateringoutlets?view=printerfriendly (last accessed 01/12/2017)

219. Moreover, the design of calorie labels appears to have a big impact on their effectiveness. For example, a study by Dallas et al. (2018)[95] shows that labelling on the left-hand side of a menu leads to a higher reduction in calories than placing the same labels on the right-hand side. A standardised design could therefore ensure that the most practicable and effective form of labelling is introduced.

220. Based on the evidence it seems likely that non-standardised OOH energy labelling would result in a reduction in the proportion of consumers using the information when making purchasing choices. This would probably be due to a reduction in visibility (if energy information fails to stand out) and usability (confusion in interpreting numbers). However, since these studies are qualitative in nature we are unable to quantify the reduction in labelling usage by consumers.

d) Extending the timeline for implementation for micro businesses

221. Extending the introduction from one year to two years for micro businesses will delay the onset of both costs and benefits, and therefore for the sector, when compared to Option 2.

222. Because the one-year notice period would still apply to non-micro businesses, their costs will remain unchanged, when compared to Option 2.

223. For costs to micro businesses, the same assumptions and calculations have been made as in previous options, with the exception that we now estimate printing costs to be £0 as the two-year notice period should allow microbusinesses to relabel within normal cycles.

224. Compared to Option 2, enforcement costs will be reduced in the first year as only outlets belonging to small, medium and large business would need to be inspected. In the second year, all outlets would be inspected bringing costs back in line with Option 2.

225. The table below provides a breakdown of costs for the first three years of implementation, plus annual ongoing costs from year 4 once all businesses are within scope of the regulation. The costs presented below are on an England only basis.

Table 16: Costs summary (extended timeline)

	Year 1	*Year 2*	*Year 3*	*Per annum from year 4*
Costs to business (£'000s)	**£19,252**	**£44,240**	**£15,214**	**£18,733**
Familiarisation with regulations	£368	£1,915	£0	£0
Product assessment tool	£13,538	£13,538	£13,538	£13,538
Transition calculating energy values	£5,343	£11,171	£0	£0
Annual ongoing energy values	£0	£3,520	£1,676	£5,195
Labelling	£3	£14,097	£0	£0
Costs to DHSC (£'000s)	**£7,718**	**£12,162**	**£12,162**	**£12,162**
Familiarisation with regulations	£112	£0	£0	£0
Enforcement	£7,606	£12,162	£12,162	£12,162

226. Benefits accrued in the first year of implementation will be reduced as only small, medium and large businesses would be providing energy labelling. All benefits discussed below are on an England-only basis.

227. As in Options 2 and 3, the average reduction in calorie consumption for all consumers would be 24 kcal per meal and 12 kcal per person per day. Since around quarter of meals eaten out in the UK are products where energy labelling is already supplied, and a further 22% of meals are purchased from micro businesses which are exempt in year one, the proportion of meals served in businesses affected by the new regulations in the first year is 52%.

228. Applying 52% to 12 kcal and accounting for the higher efficiency of contextual labels, results in an estimated average reduction in calorie consumption of 9 kcal per person per day in the first year.

[95] Dallas, s.; Liu, P.; Ubel, P. (2018) Don't count calorie labelling out, Journal of Consumer Psychology, available online at https://doi.org/10.1002/jcpy.1053 (last accessed 01/06/18)

229. For the second year onwards, including micro businesses increases the proportion of meals served with calorie labelling to 74%. Applying 74% to 12 kcal and again uplifting to account for contextual labelling results in an estimated average reduction in calorie consumption of 13 kcal per person per day from the second year onwards.

230. Over 25 years, discounted health benefits through reduced mortality and morbidity are estimated at around 108,000 QALYs, with a present value of £4.9bn when monetised at £60,000 per QALY. Reduced morbidity would also result in reduced cost pressures to the NHS. There would be additional health benefits to the population from reinvesting these savings back into the health service; these are estimated to be worth around £3.4bn over the 25-year assessment period. Social care savings are estimated to be £700m over 25 years. Reduction in mortality and morbidity also results in an economic output increase through longer or additional participation in the labour force of £120m.

231. There would also be total health benefits, NHS savings, economic benefits and social care savings due to reformulation, worth £2.2bn. This includes a 40% reduction for compensating behaviour.

One in three out (OITO) calculation

232. All quantified costs to business are direct costs, with all activity occurring within the UK. It has not been possible at this stage to quantify all impacts to business - as such, we present only a partial estimate of the total EANCB. Work will continue during the consultation to refine and extend the scope of this estimate. Our partial assessment of EANCB for Option 2 is £16.9m and £6.5m for Option 3, in 2014 prices and discounted to 2015.

Sensitivity and risk analysis

Interaction of policy effects

233. Due to the substantial number of policies, which are being consulted on, the potential interactions between options have not been quantified.

234. The central estimates above consider the impact of OOH energy labelling in isolation to the other policies announced as part of the *Childhood obesity: a plan for action*, *Childhood obesity: a plan for action – chapter 2*, or any possible future actions by government. We recognise that there will be interactive effects between this policy and others being proposed or already enacted. This section considers what form these interactive effects are likely to take, and what impact this will have on reducing childhood obesity and on imposing costs to the food industry.

235. When considering the interactive effects with other policies, reformulation is the most relevant strand of the childhood obesity strategy. PHE's reformulation programmes are challenging all sectors of industry, including OOH, to reduce the amount of sugar and calories in certain products by 20% over the next 5 years. If successful, both schemes will reduce the expected fall in calorie consumption and the benefits from the restrictions considered in this Impact Assessment.

236. The main cost to businesses of OOH energy labelling arises from calculating energy values for products. These costs include writing down recipes, weighing ingredients and possibly using a calorie calculator tool to assess and record the energy values. For those businesses that engage with PHE's reformulation programmes, there may be some duplication of these costs.

237. This section has not attempted to quantify these interactive effects as this Impact Assessment presents several OOH energy labelling options at consultation stage which, when interacted with other policies proposed in the strategy, would result in a significant number of permutations. Furthermore, as the main policy of interest in terms of interactive effects with OOH energy labelling are the voluntary calorie and sugar reduction programmes, any quantification would depend on the overall take-up rate of the programme by the OOH sector and the distribution of take-up amongst different types of businesses.

Critical value analysis

285. As mentioned previously, it's possible that wider factors may shift to offset the calorie reduction expected because of this policy. While this is not considered to be the most likely outcome, this cannot be ruled out. To assess the impact of this, we have considered the degree of offsetting required to result in a neutral NPV.

286. Our central estimate for Option 2 found combined health, NHS, social care savings and economic activity benefits to be worth £10.6bn over the 25-year evaluation period. Total costs are valued at £630m over the same period (£350m of which are costs to business). This suggests that 94% of the direct benefits of the policy would need to be offset for it not be deemed socially beneficial. This is equivalent to an average calorie reduction by 0.9 kcal per person per day.

287. For Option 3, the combined benefits are estimated to be worth £7.4bn and total costs are valued at £470m (£295m are direct costs to businesses) over the 25-year assessment period. Again, this suggests that 94% of the direct benefits of the policy would need to be offset for it not be deemed socially beneficial. This is equivalent to an average reduction by 0.7 kcal per person and day.

288. If this policy is implemented and results in no calorie reduction, the full costs will still occur but without any of the estimated benefits. For Option 2 this would result in an NPV of -£630m and for Option 3 this would result in an NPV of -£470m.

Sensitivity analysis

289. We recognise that many of the calculations in this Impact Assessment currently display only illustrative costs based on plausible assumptions. The specific choices of these assumptions can have a substantial impact on the final estimates. To assess the size of this impact we have varied the key assumptions in the analysis.

290. Calculations are performed below for the costs and benefits of the central estimate of Option 2 and Option 3. As the same calculation methodology has been used across each option, the impact of variables differing from our central assumptions are similar for both options.

291. The sensitivity analysis of the costs shows variations in the cost to business (calorie calculator tool, familiarisation calculating energy values, and labelling) and the cost to government (enforcement costs).

292. The analysis of the benefits varies the proportion of consumers who use labelling, the average calorie reduction by those who use labelling, the proportion of consumers who use labelling across all BMI groups, and the average reduction in calorie consumption across all BMI groups. We vary those assumptions individually and then combined to achieve the final lower, best, and upper benefit estimate.

293. We also consider the case of more businesses and outlets in the out-of-home sector.

Option 2

Costs

Costs to Business

294. As detailed earlier, the estimated costs to businesses are associated with using a calorie calculator tool, familiarisation with the new regulations, the cost of calculating the energy content of products and labelling costs.

295. Calorie calculator subscriptions vary widely across providers. Some tools are available for free whereas others require monthly or yearly fees. In Table 17 we have varied the possible cost to businesses. Micro businesses are expected to use a free tool. (We are not considering the possibility that more or all businesses decide to use a free tool in which case the cost would be 0).

Table 17: Varying the costs of a calorie calculator tool

Assumption tested		**Lower**	**Central**	**Upper**
Fees for calorie calculator tool	***Input value (yearly subscription fee)***	***£150***	***£500***	***£1,350***
	Cost to OOH sector for using a calorie calculator tool (£m)	£4.0	£13.5	£36.5
	Cost of calculator tool across 25 years (PV, £m)	£69	£231	£624

296. Familiarisation costs were calculated by multiplying the number of businesses in the OOH sector by the average wage for a restaurant and catering establishment manager by one hour. We have used the median, maximum and minimum percentiles for a manager's wage as detailed in the

Annual Survey of Hours and Earnings[96] uprated for on-costs to perform sensitivity analysis on our estimates. The potential range is given in Table 18 below.

Table 18: Varying the business cost of familiarisation with the regulations

Assumption tested		**Lower**	**Central**	**Upper**
Average hourly wage rate for restaurant and catering managers	***Input value (hourly salary)***	***£10.30***	***£13.60***	***£17.50***
	Cost to OOH sector for familiarisation with regulations (£m)	£1.7	£2.3	£2.9

297. The two assumptions made when estimating the costs of calculating the energy content of products are the average number of menu items per business and the average time taken by businesses to calculate each value. We have varied these assumptions to estimate the potential range of these business costs in Table 19 below (excluding the cost of sharing the calorie content information with individual outlets).

298. The central estimate for the number of menu items is based on the FDA's estimate of the number of menu items in the US that we adjusted using responses to an Irish consultation on calorie labelling. We have used the US estimate without adjustment as the upper estimate but have kept the lower estimate the same as in the central scenario. This results in a wider variation in costs between the central and upper scenarios than between the lower and central scenarios.

Table 19: Varying the business cost of calculating energy values

Assumption tested		**Lower**	**Central**	**Upper**
Average time per item to calculate energy values	***Input value (minutes per item)***	***5***	***7***	***10***
	Transition cost for OOH sector to calculate energy values of products (£m)	£12.7	£16.5	£22.2
	Annual cost from year 2 for OOH sector to calculate energy values of products (£m)	£4.6	£5.2	£6.1
	Calculating energy content of new or reformulated products across 25 years (PV, £m)	£74.3	£83.4	£97.2

299. When estimating labelling costs, we made three assumptions: the average cost to design a new menu, the print cost per menu and the number of menus per business. Table 20 below demonstrates how the estimated labelling costs vary as we adjust these assumptions. Our lower and upper estimates for the design and print costs are based on the lower and upper range of costs from the web quotes from which the central estimate was obtained.

Table 20: Varying labelling costs to business

Assumption tested		**Lower**	**Central**	**Upper**
Average design cost	***Input value (design cost)***	*£50*	*£100*	*£150*
Average print cost per menu	***Input value (print cost)***	*£0.10*	*£0.30*	*£0.50*
Average number of menus per business	***Input value (number of menus)***	*10*	*20*	*30*
	Labelling cost for OOH sector (£m)	£8.5	£17.6	£27.3

[96] ONS (2017) Annual Survey of Hours and Earnings , Table 14.5 https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/earningsandworkinghours/datasets/occupation4digitsoc2010ashetable14 (last accessed 17/05/2018)

Costs to Government

300. Since the enforcement costs are not an insignificant part of the final Net Present Value calculation, we have also performed sensitivity analysis on these costs. We have not included familiarisation costs to local authorities as these represent a very small proportion of the total enforcement costs.

301. Enforcement costs arise from several assumptions around staff costs and laboratory testing of samples, which will be tested at consultation. The key assumptions leading to the former is the frequency of trading standard visits and the additional time required per location; the key assumptions for the testing costs are the laboratory costs per sample and the percentage of sites undertaking such testing. Table 21 depicts the range of estimates for enforcement costs as we alter the input values[97].

Table 21: Varying enforcement costs to local authorities

Assumption tested		**Lower**	**Central**	**Upper**
Frequency of trading standards visits (visits per year) *Additional time required per visit (mins)* *Cost of lab testing calorie content* *Percentage of sites tested*	***Input value (frequency of visits)***	***0.25***	***0.5***	***1***
	Input value (additional mins per visit)	***5***	***15***	***45***
	Input value (cost of lab test (per sample))	***£15***	***£30***	***£45***
	Input value (% of sites tested)	***5%***	***10%***	***15%***
	Annual enforcement costs (£m)	£1.7	£12.2	£62.8
	Present value of enforcement costs (£m)	£39.3	£279.6	£1,443.7

Benefits

302. The key assumptions made when calculating the benefits are:

- The average reduction in calorie consumption;
- The proportion of consumers who notice and use energy labelling is equal across all BMI groups;
- The average reduction in calorie consumption by those who use energy labelling is equal across all BMI groups.

303. The central estimate for the average reduction in calorie consumption according to the down weighted Cochrane review value is 24 fewer calories. This is uprated to 28 kcal to account for higher effectiveness due to contextual information on the labels.[98]

304. We have used a reduction of 0 kcal as the lower estimate, accounting for a case in which calorie labelling does not result in different meal choices. For the upper estimate, we have used a reduction of 42 kcal (a 50% increase). The range of benefits this generates is detailed in Table 22 below.

[97] As detailed in Option 2, enforcement costs have been uplifted to take into the opportunity of DHSC reimbursing local authorities.

[98] For the benefits in this sensitivity analysis, we have only considered benefits directly from labelling and not those due to reformulation, which only make up a much smaller fraction of the total benefits.

Table 22: Varying the average calorie reduction

Assumption tested		Lower	Central	Upper
Average calorie reduction in consumption at that purchase	***Input value***	***0***	***28***	***42***
	Average additional calorie reduction per person	0	13	19
	QALYs	0	109,000	163,000
	Value of QALYs (£bn)	£0	£5.0	£7.5
	Reduction in cost pressures to the NHS (£m)	£0	£3,500	£5,230
	Increase in economic output (£m)	£0	£120	£180
	Social care savings (£m)	£0	£700	£1,050

305. We have assumed that the average reduction in calories consumed due to labelling are constant across the population. It seems reasonable to consider whether this is likely to be different for the obese and overweight population compared to the healthy weight population.

306. It is not clear whether overweight and obese individuals are more or less likely than the healthy weight individuals to notice and use energy labelling or whether parents of obese or overweight children make different food and drink choices for their families than parents of healthy weight children. As an illustration of the impact, we have considered scenarios where the proportion of obese and overweight consumers using labelling is 10 percentage points higher and 30 percentage points lower than the average (in our central estimate we assume that overweight and obese consumers use labelling 10% more than the normal weight population). We have adjusted the proportions for the healthy weight population accordingly to ensure the average for all consumers remains constant.

Table 23: Varying the proportion of consumers who use labelling by BMI

Assumption tested		Lower	Central	Upper
Proportion noticing and using labelling is different for obese & overweight consumers from healthy weight consumers	***Input value (additional use of labelling by obese & overweight)***	***-20%***	***10%***	***20%***
	Average additional calorie reduction per person	9	13	14
	QALYs	76,000	109,000	114000
	Value of QALYs (£bn)	£3.5	£5.0	£5.2
	Reduction in cost pressures to the NHS (£m)	£2,430	£3,500	£3,660
	Increase in economic output (£m)	£80	£120	£130
	Social care savings (£m)	£490	£700	£730

307. It seems reasonable to assume that the number of calories consumed per meal is higher for the obese and overweight population than the healthy weight population. Therefore, it also seems reasonable to assume that the average calorie reduction experienced by obese and overweight consumers who use labelling is greater than for healthy weight consumers.

308. The study by Dumanovsky[99] estimates that the average number of calories consumed at that purchase for all consumers was 859 calories. To illustrate the impact of variation in calorie reduction

[99] Dumanovsky T, et al. (2011). Changes in Energy Content of Lunchtime Purchases from Fast Food Restaurants after Introduction of Calorie Labeling: Cross Sectional Customer Surveys, British Medical Journal. doi: 10.1136/bmj.d4464

by BMI, as our upper case we have considered the scenario where the obese and overweight population consume 20% more calories than average. Again, we have adjusted the calorie consumption of the healthy weight population to ensure the average for all consumers remains constant. It seems highly unlikely that obese and overweight consumers would consume fewer calories than an average consumer would, so our lower estimate remains the same as our central estimate. The impact of this distribution by BMI is estimated in Table 24 below.

Table 24: Varying the average calorie reduction by BMI

Assumption tested		Lower	Central	Upper
Average calorie reduction is different for obese & overweight consumers from healthy weight consumers using labelling	***Input value (additional calories consumed by obese & overweight)***	***0%***	***10%***	***20%***
	Average additional calorie reduction per person	11	13	14
	QALYs	98,000	109,000	114,000
	Value of QALYs (£bn)	£4.5	£5.0	£5.2
	Reduction in cost pressures to the NHS (£m)	£3,160	£3,500	£3,660
	Increase in economic output (£m)	£110	£120	£130
	Social care savings (£m)	£640	£700	£730

309. As when varying the proportion of obese and overweight consumer using labelling, varying the average calorie reduction for obese and overweight consumers results in different benefits even though the average calorie reduction for all consumers remains constant.

310. To estimate the absolute extremes, we have interacted all four assumptions using the lowest estimate for all assumptions to obtain the 'worst case scenario' and using the highest estimate for all assumptions to obtain the 'best case scenario' (Table 25).

Table 25: Varying all four key benefits assumptions

Assumption tested		Lower	Central	Upper
Average calorie reduction in consumption at that purchase by all consumers using labelling *Proportion of all consumers who notice and use calorie labelling in OOH setting* *Average calorie reduction varies by BMI* *Proportion of consumers using labelling varies by BMI*	***Input value (proportion using labelling)***	***0***	***28***	***42***
	Input value (average calorie reduction)	***50%***	***100%***	***100%***
	Input value (additional calories consumed by obese & overweight)	***0%***	***10%***	***20%***
	Input value (additional use of labelling by obese & overweight)	***-20%***	***10%***	***20%***
	Average additional calorie reduction per person	0	13	22
	QALYs	0	109,000	194,000
	Value of QALYs (£bn)	£0	5.0	£8.9
	Reduction in cost pressures to the NHS (£m)	£0	3,500	£6,210

	Increase in economic output (£m)	£0	120	£210
	Social care savings (£m)	£0	700	£1,240

NPV and EANCB

311. By varying the key assumptions in calculating the costs and benefits detailed above simultaneously, we can estimate a range for the Net Present Value (NPV). In creating the lower NPV estimate, we have used the highest business cost estimate and the lowest benefits. In creating the upper NPV estimate, we have used the lowest estimate of costs incurred and the highest benefits.

312. It's not thought likely that these situations would occur, but they can give some indication as to the extremes of the expected outcomes. The table below presents the range of estimates for the NPV for Option 2, as estimated over a 25-year assessment period, on an England only basis.

313. As detailed in the benefit calculations above, different levels of compensation have been considered for the benefits due to reformulation. For the lower estimate, we have applied a compensation of 100%, for the central estimate 40%, and for the higher estimate 0%.

Table 26: Costs and benefits – Option 2

Group affected	**Impact**	**Present value (m£)**		
		Lower	***Central***	***Upper***
OOH businesses	Familiarisation with regulations	-2	-2	-3
	Calorie calculator tool	-69	-231	-624
	Initial calculation of energy content of products	-13	-17	-22
	Calculating energy content of new or reformulated products	-74	-83	-97
	Initial labelling and write off costs	-9	-18	-27
	Re-labelling costs	unquantified		
	Change in profits	unquantified		
	Total OOH business impact	**-166**	**-351**	**-773**
Wider society	Health benefits	0	5,670	10,016
	Economic output	0	136	237
	Total societal impact	**0**	**5,806**	**10,253**
Government	Familiarisation with regulations	-0.1	-0.1	-0.1
	Enforcement	-39	-280	-1,444
	NHS savings	0	795	1,398
	Social care savings	0	3,970	6,994
	Total Government impact	**-39**	**4,486**	**6,948**
NPV		**- 206**	**9,941**	**16,428**

Option 3

NPV and EANCB

314. By varying the key assumptions in calculating the costs and benefits as detailed for Option 2 above also for Option 3, we can estimate a range for the Net Present Value (NPV). In creating the lower NPV estimate, we have used the highest business cost estimate and the lowest benefits. In creating the upper NPV estimate, we have used the lowest estimate of costs incurred and the highest benefits.

315. It's not thought likely that these situations would occur, but they can give some indication as to the extremes of the expected outcomes. The table below presents the range of estimates for the NPV for Option 3, as estimated over a 25-year assessment period, on an England only basis.

316. As detailed in the benefit calculations above, different levels of compensation have been considered for the benefits due to reformulation. For the lower estimate, we have applied a compensation of 100%, for the central estimate 40%, and for the higher estimate 0%.

Table 27: Costs and benefits – Option 3

Group affected	**Impact**	**Present value (m£)**		
		Lower	***Central***	***Upper***
OOH businesses	Familiarisation with regulations	-0.3	-0.4	-0.5
	Calorie calculator tool	-69	-231	-624
	Initial calculation of energy content of products	-5	-5	-6
	Calculating energy content of new or reformulated products	-55	-57	-59
	Initial labelling and write off costs	-1	-3	-4
	Re-labelling costs	unquantified		
	Change in profits	unquantified		
	Total OOH business impact	**-130**	**-296**	**-693**
Wider society	Health benefits	0	3,962	6,970
	Economic output	0	91	168
	Total societal impact	**0**	**4,053**	**7,138**
Government	Familiarisation with regulations	-0.1	-0.1	-0.1
	Enforcement	-25	-175	-903
	NHS savings	0	555	989
	Social care savings	0	2,754	4,900
	Total Government impact	**-25**	**3,134**	**4,986**
NPV		**-155**	**6,891**	**11,430**

Specific Impact Tests

Small and Micro Business Assessment

317. This section considers the estimated impact specifically on small and micro businesses (SMBs). The consultation process is intended to provide further evidence to inform the preferred option.

Non-quantifiable impact on small and micro businesses

318. We expect that mandating calorie labelling will disproportionately burden small and micro businesses (SMB). Small changes in their cost or profit levels can affect SMBs sustainability and, therefore, there is a risk that even a small impact on them could cause some to go out of business. For example, a shortage of staff due to the time needed for familiarisation and implementation could lead to additional costs for SMBs, which naturally have fewer employees than larger out-of-home businesses. We cannot directly quantify this burden to assess if it will outweigh the benefits of regulation at this stage. The consultation process is intended to provide further evidence on this question.

Quantifiable Impacts

319. We have examined the impact of each of the following three categories of business costs on SMBs:

- Familiarisation with the regulations;
- Voluntary use of a calorie calculator tool;
- Calculating the energy content of products;
- Labelling costs.

320. Table 28 provides estimates of the cost specifically to SMBs presented alongside the cost to all businesses in the OOH sector. All estimates have been calculated as described earlier, but applied to the total number of OOH SMBs as opposed to the total number of OOH businesses. All estimates are on an England only basis.

Table 28: Costs to small and micro businesses

Group affected	*Costs (£'000s)*	*Micros*	*SMBs*	*All businesses*	*% Micros*	*% SMBs*
OOH businesses	**Transition costs**					
	Familiarisation with regulations	£1,920	£2,240	£2,280	84%	98%
	Calorie calculator tool	£0	£12,030	£13,540	0%	89%
	Transition calculating energy values for current products	£11,170	£13,570	£16,510	68%	82%
	Labelling	£14,940	£17,350	£17,650	85%	98%
	Total	*£28,030*	*£45,190*	*£49,980*	56%	*90%*
	Annual costs					
	Ongoing calculating energy values for new and reformulated products	£1,680	£2,450	£5,200	32%	47%
Government	**Transition costs**					
	Familiarisation with regulations	£112	£112	£112	100%	100%
	Annual costs					
	Enforcement	£4,560	£5,720	£12,160	38%	47%

321. All assumptions regarding business costs have been applied to all OOH businesses due to a lack of evidence on whether these would vary by size of business. It is possible that the costs experienced by SMBs will be proportionately different to those costs experienced by medium and large businesses.

322. For instance, some costs, such as calculating energy values and designing menus, are assumed to be incurred at a business level. For SMBs where the number of outlets per business is likely to be much lower, this may result in greater costs, especially micro businesses. However, as it is not clear whether SMBs introduce new or reformulated products at a significantly different rate, we cannot be sure whether the overall cost will be greater than for larger businesses.

323. It seems likely that smaller independent businesses are more likely to have a greater proportion of seasonal products or 'specials' for which energy labelling would not be required. However, it is also possible that smaller businesses rotate items more frequently than larger chains and so incur higher costs. Due to a lack of available evidence on any differences between smaller and larger businesses in rotating menu items (if these exist), we assume there is no significant difference due to business size.

324. Similarly, it is likely that SMBs will have less floor space and therefore fewer tables and menus. This could result in lower printing costs as fewer menus are printed, but it could also result in higher printing costs because costs are often based on bulk batches of menus, which may be higher than the number of menus an SMB needs.

325. Even though, some small businesses may find it beneficial to pay for an online tool, we expect micro businesses to find other ways to calculate the energy content of their menu items, e.g. a free calorie calculator application. As there is a huge variety of such tools available, each business will be able to find a supplier that best fits their needs and therefore, costs will vary for each business.

326. We have included consultation questions on the differential impact of costs on larger businesses (including chains) and smaller independent businesses. These are listed at the appropriate point in in the document and in Annex B – Questions for consultation.

327. We have also estimated the benefits (due to energy labelling and reformulation including 40% compensation) in SMBs and compared them with the benefits across the entire OOH sector, as presented in Table 29 below.

Table 29: Benefits SMB compared to all businesses

Benefits	**Micros**	**SMBs**	**All businesses**	***% Micros***	***% SMBs***
Average additional calorie reduction per person per day	3.2	6.0	14.2	*22%*	*42%*
QALYs	27,000	52,000	123,400	*22%*	*42%*
Value of QALYs (£bn)	2.6	4.9	11.7	*22%*	*42%*
Reduction in cost pressures to the NHS (£m)	883.2	1676.8	3970.4	*22%*	*42%*
Increase in economic output (£m)	33.6	56.6	136.2	*25%*	*42%*
Social care savings	181.0	339.6	794.8	*23%*	*43%*

328. The benefits detailed above do not include the following likely but unquantifiable benefits of ensuring the entire OOH sector is covered by regulation:

- the increased prevalence of labelling may increase the proportion of consumers noticing and using the labelling;
- energy labelling across all businesses may reduce the likelihood of consumers switching businesses because one provides labelling demonstrating the healthiness of their products and one does not.

329. Most of the business cost falls on SMBs since they comprise 98% of all businesses in the OOH sector, roughly 165,000 SMBs. We estimated that around 42% of the benefits are a result of energy

labelling in SMBs, and implementing the same regulation across the entire sector levels the playing field. Micro businesses carry more than 50% of the costs and are responsible for only 22% of the benefits.

330. In our post-implementation review, we will examine whether any business exclusions are justified.

Equality Test

331. A separate Equality Analysis[100] has been conducted to assess the potential impact of the policy on groups with protected characteristics as part of the Government's duties under the Equality Act 2010.

Inequality Test

332. A consideration has been made to take into account the Secretary for Health and Social Care's duty to reduce inequalities with respect to benefits from the health service (under section 1C of the NHS Act 2006).

333. Included in *Childhood obesity: a plan for action - chapter 2*[101], is a commitment to significantly reduce the gap in obesity between children from the most and least deprived areas. The best data source for inequalities in childhood obesity is the National Child Measurement Programme, which measures children in Reception and in Year 6. The latest data shows us that obesity rates are significantly higher in more deprived areas of the UK at Reception and Year 6. The obesity rate inequality gap grows as children move from Reception to Year 6 and both years' gaps in obesity prevalence have increased significantly over the last 10 years.

Obesity Rate Prevalence by IMD2015 Decile				
		Most Deprived	**Least Deprived**	**Gap**
4 - 5 years old	**2006/07**	12.3%	7.1%	5.1%
	2016/17	12.7%	5.8%	6.8%
10 - 11 years old	**2006/07**	21.5%	12.1%	9.4%
	2016/17	26.3%	11.4%	15.0%
Source: PHE analysis of National Child Measurement Programme				

334. Our initial assessment of the potential impacts on obesity rate inequalities shows:

335. Lower income and education have been significantly associated with being unable to identify nutritional labelling correctly[102]. Studies[103,104] suggest that energy labels are more likely to be used and understood by higher income individuals.

336. We expect a positive health effect on all individuals regardless of income. However, we would expect the health benefits from this policy to accrue disproportionately to those higher income individuals, which would worsen the inequality gap.

337. The policy aims to make calorie information as accessible as possible by providing consistent and contextual labels. Studies have found that contextual information increases the ability to understand and use the labels[105].

[100] Childhood obesity plan for action chapter 2: equality assessment: https://www.gov.uk/government/publications/childhood-obesity-plan-for-action-chapter-2-equality-assessment

[101] Childhood obesity plan for action chapter 2: https://www.gov.uk/government/publications/childhood-obesity-a-plan-for-action-chapter-2

[102] Sinclair, S., Hammond, D., & Goodman, S. (2013). Sociodemographic differences in the comprehension of nutritional labels on food products. Journal of nutrition education and behavior, 45(6), 767-772

[103] Campos, S., Doxey, J., & Hammond, D. (2011). Nutrition labels on pre-packaged foods: a systematic review. Public health nutrition, 14(8), 1496-1506.

[104] Green, J. E., Brown, A. G., & Ohri-Vachaspati, P. (2015). Sociodemographic disparities among fast-food restaurant customers who notice and use calorie menu labels. Journal of the Academy of Nutrition and Dietetics, 115(7), 1093-1101.

338. Reformulation reduces calories across all socioeconomic groups and will therefore have a positive effect on everyone who eats out-of-home.

339. The post-implementation review will gather evidence of impact and will consider evidence of any differential impact by deprivation.

18. Do you think this proposal would have a differential impact on persons who share a relevant protected characteristic and persons who do not share it?

19. Do you think this proposal would have a differential impact on people from different socioeconomic groups? If so, would this increase or decrease health inequalities?

Competition Test

Does the proposal:

1. *Directly limit the number or range of suppliers?*
   - The proposal places no direct limit on the number of suppliers that can operate in the market.

2. *Indirectly limit the number or range of suppliers?*
   - The costs to individual businesses may vary, for example depending on the number of menu items on offer but these costs are unlikely to be prohibitively high for individual businesses so unlikely to limit the number of businesses operating.
   - If exempt, small and micro businesses could voluntarily provide energy labelling if they believe it will benefit their business.
   - Under any option, the costs to businesses are unlikely to be prohibitive to entry, and the additional costs will be lower for new businesses since they will not have existing menus that need relabelling.

3. *Limit the ability of suppliers to compete?*
   - Currently there are businesses already providing voluntarily energy labelling, which may be a form of product differentiation to compete with rivals.
   - Businesses voluntarily providing energy labelling account for around a quarter of the market, and this proposal will ensure a level playing field.
   - The proposal does not limit businesses ability to compete on grounds of quality, geographic location, absolute price, advertisement and many other aspects on which businesses frequently compete.
   - We do not know how consumers will respond to this proposal. They may substitute between menu items within business, or they may switch to rival businesses, which produce healthier products. By informing consumers of the energy content of products, businesses will also be encouraged to compete on these grounds (e.g. through reformulation of existing products and introducing healthier products).

4. *Reduce suppliers' incentives to compete vigorously?*
   - The proposal does not exempt suppliers from general competition law, introduce or amend intellectual property regime or increase the costs to customers of switching between suppliers.
   - The policy does require businesses to provide information on energy content, but it is not thought this would be of use to competitors. Businesses are already required to share this

[105] Pang & Hammond (2013) Efficacy and Consumer Preferences for Different Approaches to Calorie Labeling on Menus, Journal of Nutrition Education and Behavior , Volume 45 (6) https://www.deepdyve.com/lp/elsevier/efficacy-and-consumer-preferences-for-different-approaches-to-calorie-0LKRwIhV0z (last accessed 06/08/2018)

information on pre-packaged food, and we are not aware of any impacts on competition arising from this.

Sustainability Test

340. There is no evidence to suggest that mandating OOH energy labelling will have an impact on sustainable development.

Environmental Test

341. There is no evidence to suggest that mandating OOH energy labelling will have a significant impact on the environment. We expect businesses to adopt labelling within normal business cycles for re-labelling and so do not anticipate any impact on the environment through labelling waste. If there is a significant and unexpected change to the composition of supplied food, it is possible that a necessary labelling change with a short lead-in time could incur costs through wastage and re-labelling.

Justice Impact Test

342. A full justice impact test for this proposal will be carried out after the consultation has been completed and the policy details have been finalised.

Rural Proofing

343. We have considered the effects of the proposal on those living in rural areas. At present, there is no evidence to suggest that there would be a significant impact.

20. Is there any further evidence to inform our assessment of the policy's impact on rural areas?

Human Rights Assessment

344. We recognise that there may be an impact on businesses in terms of Articles 10, 14, and Article 1 of Protocol 1 of the European Convention on Human Rights and would welcome submissions addressing this.

Annexes

Annex A – DHSC Calorie Model

1. This document aims to give a brief but high-level summary of the DHSC Calorie Model. The purpose of the DHSC Calorie Model is to estimate the health and NHS cost impacts caused by a change in excess calorie consumption. Further details are provided in the Technical Consultation Document.

2. The DHSC Calorie Model is a cohort-based model implemented in Microsoft Excel using an iterative approach on a yearly basis.

3. The impacts of a change in excess calorie consumption are modelled using a control and treatment scenario, with the control scenario assuming no policy implementation, and the treatment scenario assuming a calorie imbalance reduction. The effects of the policy are measured by comparing the two scenarios over a 25-year period.

4. The model simulates cohorts of adults grouped into ages 19-64 and 65-79, and children in two age groups: 4-10 and 11-18 years. It groups these broad age groups into different gender and weight categories.

5. Early results from modelling children and adults together and comparing it to modelling adults only showed that, in a 25-year period, the health benefits are predominantly in adulthood. As most impacts on children's health resulting from obesity occur later in life, it was decided that, in modelling terms, it was preferable to only include the impact during adulthood. This simplified the model significantly without compromising its quality. While impacts are not modelled in childhood, benefits for today's children are modelled when they become adults.

6. The input to the model is the calorie imbalance reduction per day set by the policy. Changes in weight and BMI caused by the reduction in excess calories are calculated and used as a starting point for the remainder of the analysis within the model.

7. The model then considers the implications of the calorie imbalance reduction on 5 diseases associated with obesity: diabetes, coronary heart disease, stroke, colorectal cancer, and breast cancer. This is done by considering changes in prevalence and mortality rates for each disease caused by changes in BMI in order to calculate the number of deaths avoided in the treatment scenario. The savings to the NHS are calculated from the reduced treatment of each disease.

8. Reductions in mortality are used to calculate the impact on economic output from an increased workforce. This is done by considering everyone within a cohort to earn the median wage of a person of that age and gender, with a larger workforce present in the treatment scenario.

9. The costs of social care savings are calculated due to a reduced proportion of overweight, obese, and morbidly obese individuals and hence fewer people needing social care in the treatment scenario.

10. Changes in QALYs are calculated from the reduced number of deaths and the reduction of people living with the diseases. These are then converted into monetised QALY using a conversion of how much society values a QALY.

11. Discount rates are applied to monetary values in order to account for changes in the treatment of costs and benefits that arise over different periods of time. This allows future values to be considered at present value.

12. The calculations (which are carried out on a year-by-year basis) are summed to calculate overall changes over a 25-year period.

Annex B – Questions for consultation

1. Are you aware of any comprehensive data sources on the number of businesses and outlets in the out-of-home food market?

2. Would you as an organisation pay for an online calorie calculator tool?

3. Is the number of menu items provided here reasonable?

4. How long will it take to assess the calorie content of a menu item?

5. Are the estimates for menu design costs, number of menus per outlet, and print cost per menu reasonable?

6. Is it reasonable to assume labelling could be done within the normal labelling cycles for larger businesses? Is it reasonable to assume micro businesses will need to implement labelling outside of their typical cycles?

7. How often do out-of-home businesses introduce new menu items?

8. What has been the impact on profit for those businesses currently providing voluntary energy labelling?

9. Are consumers switching to less energy dense products or purchasing fewer products because of energy labelling? Are consumers switching between different OOH establishments due to energy labelling?

10. Have those businesses currently providing energy labelling reformulated or designed new products differently because of energy labelling?

11. What would be the costs of reformulation?

12. Are there any additional costs to businesses that have not been captured here?

13. Are the assumptions made to estimate the costs to businesses reasonable?

14. What would be a good approach to enforce this policy?

15. Is it reasonable to assume that, on average, OOH businesses are inspected every two years?

16. Is there any further evidence on the level of compensation taking place?

17. Is there any further evidence on the effects of contextual labelling?

18. Do you think this proposal would have a differential impact on persons who share a relevant protected characteristic and persons who do not share it?

19. Do you think this proposal would have a differential impact on people from different socioeconomic groups? If so, would this serve to increase or decrease health inequalities?

20. Is there any further evidence to inform our assessment of the policy's impact on rural areas?

The Department of Health and Social Care would welcome any further comments regarding

- The calculations conducted in this Impact Assessment
- The assumptions made in this Impact Assessment, especially regarding costs to businesses
- Further UK-specific evidence of the effects of calorie labelling, e.g.
    - change in consumer behaviour, effects on businesses, reformulation by businesses

Annex C – Previous research on impact of energy labelling

The table below summarises the key academic papers considered in determining potential benefits of the proposed policy. These comprise a mix of randomised controlled trials (experimental designs) and evaluations of energy labelling in practice in US cities where calorie labelling at the point of choice is already mandatory for restaurant chains with at least 20 outlets.

Title	**Study design**	**Key conclusions**
Auchincloss, A., et al., 2013. Customer responses to mandatory menu labelling at full-service restaurants. *Am. J. Prev. Med. 2013; 45(6), 710-719.*	Data collected outside restaurants (survey and till receipts) in August 2011, following Philadelphia's implementation of mandatory calorie, sodium, fat and carbohydrates labelling for full-service restaurant chains on all printed menus in January 2010. Two Philadelphia-based outlets which had labelling were compared with five outlets based outside of Philadelphia (control sites).	Use of labelling - 76% of customers at labelled restaurants reported seeing nutrition information. - 26% of customers at labelled restaurants (34% of customers who reported seeing the information) said that seeing the nutrition information affected their order. Calories purchased - On average, customers at labelled restaurants purchased 151 fewer kcals from food only (9%) or 155 fewer kcals from food and beverages (9%) compared to customers at unlabelled restaurants. - Customers who reported using the labelling purchased 400 fewer kcals from food compared to other customers (a relative difference of 20%).
Bassett, M.T., Dumanovsky, T., Huang, C., et al., 2008. Purchasing behavior and calorie information at fast-food chains in New York City, 2007. *Am. J. Public Health 98, 1457–1459.*	Analyses based on till receipts and a customer survey after exiting the restaurant. Whilst the study included a wide range of outlets, only Subway was included in the analysis.	Consumers that reported seeing calorie labelling: - 32% of Subway customers reported seeing calorie labelling - Customers who reported seeing the labelling purchased 52 fewer calories than those who did not report seeing the labelling. Consumers that reported that calorie labelling affected their purchase: - 37% of Subway customers reported that the labelling affected their purchases. - Customers who reported noticing and using the labelling purchased meals with 99 fewer calories than

		customers who saw the information but reported not using it.
Bollinger, B., Leslie, P., Sorensen, A., 2010. Calorie posting in chain restaurants. Working Paper No. 15648.National Bureau of Economic Research, Cambridge (MA) http://www.nber.org/papers/w15648	Transaction data from Starbucks loyalty cards from all 222 Starbucks outlets in New York City were analysed, with 94 Starbucks outlets in Boston and Philadelphia (where calorie labelling was not mandatory) was used as a control. Data was collected 3 months prior to the introduction of mandatory calorie labelling and for 11 months after. Only considers one chain where majority of sales are beverages.	Overall, a 6% decrease in calories on average per transaction. - Little effect on calories from beverages, but reduction in calories from food purchases of 14%. - For people averaging more than 250 calories before calorie posting (higher than average) calories reduced by 26% on average per transaction. - Effects were long-lasting with the calorie reduction consisting for the 10-month data collection period after calorie labelling was introduced.
Cantor, J. et al., 2015 Five Years Later: Awareness of New York City's calorie labels declined with no changes in calories purchase. *Health Affairs 34.11*	Study of 4 fast food chains in New York using till receipts from 7,699 consumers. Difference-in-difference study comparing levels of consumers noticing and using labelling pre-regulation to immediately afterwards (2008) and to three different points in 2013-14	Use of labelling - Consumers exposed to menu calorie labelling immediately after regulation in 2008 and consumers exposed to labelling at three points in 2013-14 reported seeing and using calorie information more often than consumers at fast food restaurants without labelling. - Over time, the proportion of respondents noticing and using calorie information declined. - At each time point post-regulation the proportion of respondents noticing and using calorie information was higher than the proportion pre-regulation. Calories purchased - No statistically significant change over time in levels of calories or other nutrients purchased. Visits to fast food restaurants - No statistically significant change over time in frequency of visits to fast food restaurants.
Crockett RA, King SE, Marteau TM, Prevost AT, Bignardi G, Roberts NW, Stubbs B, Hollands GJ, Jebb SA.	Systematic review and meta-analysis of 28 studies in research databases in October 2013. (Meta-analysis only included three RCTs in restaurants or cafeterias to estimate a	Calories purchased - significant reduction of 47 kcal in energy purchased - energy labelling in real-world settings reduced energy purchased per meal by 7.8% - meta-analysis of studies in artificial settings or

Nutritional labelling for healthier food or non-alcoholic drink purchasing and consumption. Cochrane Database of Systematic Reviews 2011, Issue 9. Art. No.: CD009315. DOI: 10.1002/14651858.CD009315	concrete calorie reduction due to labelling)	laboratory studies did not conclusively demonstrate a reduction in energy consumed - No evidence that calorie labelling increased number of calories purchased or consumed
Dumanovsky, T., Huang, C.Y., Nonas, C.A., Matte, T.D., Bassett, M.T., Silver, L.D., 2011. Changes in energy content of lunchtime purchases from fast food restaurants after introduction of calorie labelling: cross sectional customer surveys. *BMJ 343, d4464.*	Study of 11 different fast food chains in New York City pre- and post- regulation (2007 and 2009) of mandatory calorie labelling, using till receipts and a customer survey when exiting the outlet.	Comparison pre- and post- regulation - Unadjusted data showed no significant change in calories purchased. - After adjustment for restaurant chain, demographics and purchase type, a reduction of 20kcal in purchasing found. Comparison between those who reported using calorie labelling in decision-making and those who didn't (2009) - 15% of consumers reported that they noticed and used calorie labelling when making their purchasing decision. - Unadjusted data showed customers who used labelling purchased 106 fewer calories at that purchase than customers who did not. - After adjustment (as above), customers who used calorie labelling purchased 78 fewer calories than those who did not. - No significant change in purchase price was found between those who used labelling and those who did not.
Elbel, B., Kersh, R., Brescoll, B.L., Dixon, L.B., 2009. Calorie labeling and food choices: a first look at the effects on low-income people in New York City. *Health Aff. 28, w1110–w1121.*	Data collected one month before and two months after the introduction of mandatory calorie labelling from 14 outlets of 4 fast food chains in New York City, with 5 outlets in Newark as a control group (where labelling was not mandatory). Consumers were asked to hand in receipts and answer a short survey when exiting the outlet. Focussed on low income and ethnic	Use of labelling - From self-reported data, 54% of fast food consumers noticed calorie labelling. - Of these, 28% said that it influenced their food choices. Of these 88% reported purchasing fewer calories in response to labelling. Calories purchased - However, after calorie labelling was introduced, no significant change in calories purchased was detected from the receipts after calorie labelling was introduced in New York.

	minority groups only.	
Elbel, B., Gyamfi, J., Kersh, R., 2011. Child and adolescent fast-food choice and the influence of calorie labeling: a natural experiment. *Int. J. Obes. 35, 493–500.*	Data collected before and after the introduction of mandatory calorie labelling from 14 outlets of 4 fast food chains in New York City, with 5 outlets in Newark as a control group (where labelling was not mandatory). Consumers were asked to hand in receipts and answer a short survey when exiting the outlet. Focussed on low income and ethnic minority groups only – and adolescents and children (via their parents) in these groups.	Use of labelling - 57% of adolescents reported noticing calorie labelling. Of these 16% said that it influenced their food choices. - In total, 9% of adolescents reported using calorie labelling when making purchasing decisions. - 72% of adolescents reported taste to be the most important factor in their meal selection. Calories purchased - No statistically significant differences in calories purchased before and after labelling regulation introduced in New York, or between New York and the control (Newark) for either adolescents' own purchases or parents' purchases for their children.
Elbel B., et al., 2013. Calorie labeling, fast food purchasing and restaurant visits. *Obesity 2013; 21 (11), 2172-2179.*	Study of fast food restaurants in Philadelphia before (December 2009) and after (June 2010) regulation on mandatory calorie labelling brought in, with Baltimore as the control group. Data collected both outside restaurants (survey and till receipts) and via a random digit dial telephone survey.	- 38% of Philadelphia consumers noticed calorie labelling compared to 9-14% of consumers who had seen calorie labelling before it was made mandatory in Philadelphia or in Baltimore in either time period. - No population level changes were noted in average calories per purchase either over time (once regulation introduced) or when compared with the control group (Baltimore) - No net impact was found on the purchase of just food or just beverage calories when considered separately.
Finkelstein, E.A., Strombotne, K.L., Chan, N.L., Krieger, J., 2011. Mandatory menu labelling in one fast-food chain in King County, Washington. *Am. J. Prev. Med. 40, 122–127.*	For one Mexican restaurant chain, transactions and average calories per transaction were analysed between two-time periods – January to July 2009 (pre-introduction of mandatory calorie labelling in Washington State) and August 2009 to January 2010 (post- introduction). A control group of restaurants from the same chain outside of Washington State was used.	- No effect was found on transaction trends or calories per transaction, with no significant difference between King County restaurants and the control group.

Hammond, D., et al., 2013. A randomized trial of calorie labeling on menus, *Prev. Med. (2013),* http://dx.doi.org/10.1016/j.ypmed.2013.09.020	Blinded randomised trial of Canadian adults in 2010-11 where participants were organised into four groups to order a 'sit down' meal from an experiment menu with (i) no labelling; (ii) calories only; (iii) calories in 'traffic lights'; or (iv) calories, fat, sodium and sugar in 'traffic lights'. No price information was included on the menus.	Calories ordered - Average number of calories ordered in the group with calorie labelling only was 52 kcal (or 6%) lower than in the group with no information (851 kcal compared to 903 kcal). - Average number of calories ordered was not significantly different between each of the three labelling groups. Calories consumed - Average calorie consumption in the group with calorie labelling only was 96 kcal (or 11%) lower than in the group with no information (744 kcal compared to 840 kcal). - Average calorie consumption was not significantly different between each of the three labelling groups.
Harnack, L., French, S., Oakes, J., et al., 2008. Effects of calorie labeling and value size pricing on fast food meal choices: from an experimental trial. *Int. J. Behav. Nutr. Phys. Act. 5, 63.* http://www.ijbnpa.org/content/5/1/63	A randomised experiment in which participants in four groups ordered a fast food meal from a menu with (i) calorie labelling; (ii) value sized pricing, where product price determined by weight/volume of product; (iii) calories plus value sized pricing; or (iv) no calories plus normal pricing.	Use of labelling - 54% of participants in the calorie only group and 59% of participants in the calorie plus price group noticed calorie labelling Calories ordered and consumed - No significant differences in the average number of calories consumed by participants in the calorie, value sized pricing, calorie plus value sized pricing and control menu conditions. - No significant differences found in the selection and consumption of major food categories (e.g. soft drinks, diet soft drinks, fries and salads) or in portion sizes.
Hector D,2016. Effectiveness of numeric energy menu labelling and potential alternative formats and/or content: An evidence review. Prepared for the Working Group to the Reference Group for Fast Choices Menu Labelling in New South Wales; under the auspices of the Centre for Population Health, NSW Ministry of	A comprehensive review of studies conducted on the effectiveness of menu labelling conducted between January and March 2016	Calories ordered - There is mixed evidence but moderately convincing evidence that there is a decrease in energy purchased among those consumers who see and use calorie labelling - Systematic reviews find an average reduction by 77.8 kcal Use of labelling - 25-60% are aware of labelling (in US)

Health; Physical Activity Nutrition & Obesity Research Group		- 10-58% use information to select a healthier meal option
Long, M. W. et al., 2015 Systematic review and meta-analysis of the impact of restaurant menu calorie labelling. *Am. J. Public Health 105.5*	Systematic review and meta-analysis of 19 studies in research databases in October 2013.	Calories purchased - Among all 19 studies, menu calorie labelling was associated with a statistically significant reduction of 18 calories ordered per meal. - Among a subset of 6 controlled studies in restaurant settings, labelling was associated with a non-significant reduction of 7 calories ordered per meal. Effectiveness of strategy - Menu calorie labelling is a relatively low-cost education strategy that may lead consumers to purchase slightly fewer calories. - Findings are limited by similarity among non-restaurant studies and the relatively few number of studies conducted in restaurant settings.
Nikoloau C K, Hankey C R, Lean M E J, 2014 Calorie-labelling: does it impact on calorie purchase in catering outlets and the views of young adults? *Int. J. of Obesity doi:10.1038/ijo.2014.162*	Systematic literature review of 7 studies on the effect of calorie labelling on calories purchased, of which 6 studies provided data allowing a meta-analysis. A questionnaire to gauge views on calorie labelling was devised and sent to young adults in higher education with 1,400 young adults completing the survey.	Limited evidence supports a valuable effect from clearly visible calorie labelling for obesity prevention, and it appears an attractive strategy to many young adults. Use of labelling - 30-60% of customers noticed calorie labelling. Calories purchased - Three studies reported statistically significant reductions in calories purchased, ranging for 12 to 38 calories per meal. - Meta-analysis showed no overall effect – a non-significant reduction of 6 calories. - Amongst customers who noticed labelling, a non-significant reduction of 125 calories per meal was found. Attitudes of young adults to labelling - 46% of young adults surveyed said they would welcome calorie information in catering settings.

Pérez, C, Enrione, J, Díaz-Calderón, P, Vicente, I, Rossi, M, (2017) Effect of calorie labeling on menu selection: a preliminary study in Santiago, Chile	Quantitative study following a cross-sectional survey design (participants were intermediate income employees)	People who had chosen a hypocaloric menu (≤450 kcal) - -16% (72 kcal) for men, -19% (87 kcal) for women - 82.5% value calorie information, 54.5% are willing to change their meal choice due to the information, 49% actually change their choice - - Women are more likely to be more interested in a healthier diet than men
Pulos E, Leng K., 2010. Evaluation of a voluntary menu-labeling program in full-service restaurants. *AJPH 2010;100:1035-9.*	6 full service restaurants in Washington added nutrition information (calories, fat, sodium and carbohydrates) to their menus. Entrée sales for 30 days before and 30 days after labelling were analysed. Other courses were not considered.	- 71% of customers reported noticing the nutrition information. - 20% of customers reported ordering an entrée lower in calories as a result of the information. - On average, each customer who reported ordering a lower-calorie entrée ordered about 75 fewer calories than they did before labelling. - This equates to a 15kcal reduction for all consumers on average).
Roberto, C.A., Larsen, P.D., Agnew, H., Baik, J., Brownell, K.D., 2010. Evaluating the impact of menu labeling on food choices and intake. *Am. J. Public Health 100, 312–318.*	Experimental design where participants were split into three groups; (i) presented with a menu without calorie labelling, (ii) presented with a menu with calorie labelling, or (iii) presented with a menu with calorie labels plus a label stating the recommended daily calorie intake for an average adult. No price information was included on the menus.	- Participants in the group with calorie labelling consumed 124 fewer calories than those in the group with no labelling (an 8% reduction). - Participants in the group with calorie labelling plus the recommended daily intake label consumed 203 fewer calories than those in the group with no labelling (a 14% reduction).
Tandon, P.S., Wright, J., Zhou, C., Rogers, C.B., Christakis, D.A., 2010. Nutrition menu labelling may lead to lower-calorie restaurant meal choices for children. *Pediatrics 125, 244–248.*	Randomised controlled trial where parents of children aged 3-6 years were asked to order for themselves and their child using either a menu with calorie labelling or a menu without.	Meals for children - Parents of children aged 3-6 years who were given a menu with calorie information ordered on average 102 fewer calories for their children than parents who were given a menu without calorie information. Meals for parents - There was no significant difference between the groups

		in the choice of meals parents chose for themselves.
Tandon, P. et al., 2011. The impact of menu labelling on fast-food purchases for children and parents. *Am. J. Prev. Med. 2011; 41(4), 434-438.*	Till receipts collected from children aged 6-11 years and their parents before (2008) and after (2009) menu-labelling regulation in Seattle, compared with a control group in non-regulated San Diego County.	Use of labelling - 70-75% of children chose their meal with no parental involvement both pre- and post- regulation. - 87% of parents saw nutrition labelling after regulation, compared to 44% of parents seeing labelling before regulation in Seattle. - Of these, 13% said it influenced the choice for their child (post-regulation). Calories purchased - No change in average calories purchased for children from pre- to post- regulation in Seattle or San Diego (control). - Calories purchased by parents for themselves decreased by 100 kcals from pre- to post- regulation, but this occurred in both counties.
Zlatevska, Neumann, and Dubelaar (2018), "Mandatory calorie disclosure: A comprehensive analysis of its effect on consumers and retailers," *Journal of Retailing* https://www.uts.edu.au/about/uts-business-school/marketing/news/calorie-counts-menus-make-difference	A comprehensive meta-analysis of 186 Calorie label intervention versus control (no intervention) comparisons and meta-regression on different study characteristics as well as a multilevel modelling estimation	Consumer behaviour - significant reduction of 27 calories selected by consumers following calorie disclosure - calorie reduction is significantly stronger for overweight individuals, females, table-service restaurant and hypothetical choice scenarios - calorie reduction is more effective for lunch meals and marginally more effective for samples containing a mixture of males and females - marginally less effective for healthy meals - no significant trend pattern in reported effect sizes over the years and no significantly different consumer behavior for various food types across our data Retail behavior - response to labelling: 15 kcal less per menu item