



HAL
open science

Will calorie labels for food and drink served outside the home improve public health?

Eric Robinson, Lucile Marty, Andrew Jones, Martin White, Richard Smith, Jean Adams

► **To cite this version:**

Eric Robinson, Lucile Marty, Andrew Jones, Martin White, Richard Smith, et al.. Will calorie labels for food and drink served outside the home improve public health?. *BMJ - British Medical Journal*, 2021, 372, pp.n40. <10.1136/bmj.n40>. <hal-03360130>

HAL Id: hal-03360130

<https://hal.inrae.fr/hal-03360130v1>

Submitted on 24 Sep 2025

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



HAL Authorization

Analysis

Mandatory calorie labelling in the out-of-home food sector: an obesity policy with multiple mechanisms of action

Eric Robinson, University Reader¹
Lucile Marty, Postdoctoral Research Associate¹
Andrew Jones, University Senior Lecturer¹
Martin White, Professor of Population Health Research²
Richard Smith, Professor in Health Economics³
Jean Adams, Senior University Lecturer²

¹ Institute of Population Health Sciences, University of Liverpool

² Centre for Diet & Activity Research, MRC Epidemiology Unit, University of Cambridge

³ College of Medicine and Health, University of Exeter

Correspondence to:

Dr Eric Robinson

Institute of Population Health Sciences, University of Liverpool, Liverpool, L69 7ZA

Email: eric.robinson@liv.ac.uk

Phone: 0151 794 1187

KEY MESSAGES

- UK government has proposed mandatory calorie labelling of food and drink served outside of the home to help reduce obesity
- Evidence suggests calorie labelling may have a modest or even no effect on what food people choose when eating out
- Calorie labelling may achieve public health impacts via mechanisms other than direct changes in consumer behaviour, such as stimulating product reformulation
- Researchers and policymakers should look beyond direct impacts on consumer behaviour when judging the potential of mandatory calorie labelling policies on public health

Contributors and sources

ER conceived the paper and wrote the first draft of the manuscript. All authors provided feedback and input to the original draft and subsequent iterations. The six authors combined have expertise in public health policy, population health evaluation, psychology and nutrition. The systematic reviews and meta-analyses presented in Table 1 were identified through electronic database searches (conducted by LM and ER).

Patient involvement

No patients or members of the public were involved.

Conflicts of Interest

We have read and understood [BMJ policy on declaration of interests](#) and have the following interests to declare: ER, AJ, RS, MW and JA are part of a wider team who have recently been contracted by NIHR to evaluate the calorie labelling policy discussed here. ER has previously been the recipient of research funding from Unilever and the American Beverage Association for unrelated work. No other authors report conflicts of interest.

Funding

ER and LM were supported by the European Research Council under the European Union's Horizon 2020 research and innovation programme (grant reference: PIDS, 803194). JA and MW were supported by the Medical Research Council MC_UU_12015/6. JA and MW were also supported by the Centre for Diet and Activity Research, a UKCRC funded centre of public health research excellence; funding from Cancer Research UK, British Heart Foundation, Economic and Social Research Council (grant number ES/G007462/1), Medical Research Council (grant number MR/K023187/1), National Institute for Health Research, and Wellcome Trust (grant number 087636/Z/08/Z) is gratefully acknowledged. AJ and RS report no source of funding in relation to this work.

Licence

The Corresponding Author has the right to grant on behalf of all authors and does grant on behalf of all authors, an exclusive licence (or non-exclusive for government employees) on a worldwide basis to the BMJ Publishing Group Ltd ("BMJ"), and its Licensees to permit this article (if accepted) to be published in The BMJ's editions and any other BMJ products and to exploit all subsidiary rights, as set out in The BMJ's licence.

Mandatory calorie labelling in the out-of-home food sector: an obesity policy with multiple mechanisms of action

Standfirst

The UK government has proposed mandatory calorie labelling of food and drink served outside of the home to help reduce obesity. Although calorie labelling may have a modest or no direct impact on consumer behaviour, it has the potential to influence diet via other mechanisms. These should be more consistently considered when judging the potential public health benefits of mandatory calorie labelling.

Main Text

In 2018, the UK government proposed mandatory calorie labelling of food and drink served outside of the home in England. Whilst the policy was consulted on in autumn 2018, no policy has yet been enacted. Alongside the many well-documented non-communicable health harms of overweight and obesity, people with obesity appear to also be at increased risk of major illness and death from COVID-19¹. Describing the pandemic as a ‘wake-up call’ on obesity, in July 2020, alongside other measures targeting the marketing of unhealthy food and a mass media weight loss campaign, the UK government announced renewed plans to implement mandatory calorie labelling in the out-of-home sector. Evidence from consumer behaviour studies suggests that calorie labelling may have at best a modest effect on calories ordered when eating out. However, if this criterion alone is used to evaluate effectiveness, the policy may be incorrectly labelled as a failure. There are multiple other mechanisms by which calorie labelling may impact on diet and obesity. Only a global evaluation of the policy, with a wide lens on potential mechanisms of impact, will allow us to judge its role in improving public health.

Excessively calorific meals

Public Health England estimates that UK adults consume 200-300 calories a day more than they need to maintain a healthy body weight². Some of these excess calories come from out-of-home food sources - outlets where food or drink is ready for immediate consumption, such as takeaways, restaurants, and cafes.

Among large UK restaurant chains, less than 20% were voluntarily providing in store calorie labelling in any form in 2018³. This lack of information may be particularly problematic given the energy content of food served out of the home. We recently found that 91% of main meals served in major UK restaurant chains contained more than 600kcal - the energy content for a main meal recommended by Public Health England⁴. Consistent evidence of easy availability of other food products (e.g. beverages, desserts, side dishes) that are high in calories in the out-of-home sector has also been reported in the UK^{5 6}.

Evidence that consumers are likely unaware of the high energy content of the food they are purchasing and consuming in the out-of-home sector⁷, has led to calls for mandatory calorie labelling. In the USA, chains with more than 20 outlets nationwide are required to provide point-of-sale calorie labelling. Similar regulations have been implemented at a sub-national scale elsewhere⁸. In 2018, the UK government proposed a mandatory calorie labelling policy for England, with a primary purpose to “ensure that consumers have the information they want in order to make informed and healthy choices”⁹. Further details published in 2020 indicate that future legislation will make calorie labelling mandatory for businesses with 250+ employees on all items prepared and sold for immediate consumption.

There will be a 12-month implementation period from the point of legislation. The timing of the legislation has not yet been revealed by government.

Does calorie labelling change consumer behaviour?

If calorie labelling policies reduce the number of calories consumers select when eating out, then they could benefit public health. For this type of informational policy to have the intended effects on consumer behaviour, consumers need to: (i) pay attention to calorie information; (ii) understand it; and then (iii) be sufficiently motivated to change from a higher to a lower calorie choice.

Unfortunately, evidence suggests that, at best, out-of-home calorie labelling has a modest impact on calories purchased and may have no effect whatsoever. Most reviews conclude that out-of-home calorie labelling does not result in significant changes to consumer behaviour (Table 1). However, the most recent Cochrane review and meta-analysis¹⁰ concluded, on the basis of three low quality studies conducted in the US, that there is weak evidence of a modest effect with calorie labelling resulting in -47kcal (95% CIs -79kcal, -15kcal) purchased per meal. A recent observational study in a US fast food franchise found a reduction of -60kcal (95%CI -72 to -48) per transaction immediately after implementation that reduced in magnitude over the following year to -23kcal per transaction¹¹. Whilst these effect sizes are not insubstantial, the small number of low-quality studies available makes conclusions tentative at best.

Furthermore, Table 1 shows that the majority of studies to date come from the US, which limit the generalisability of conclusions due to potential cultural differences. More recent studies conducted in England report no significant impact of labelling on calories ordered^{12 13}.

Thus, there is a distinct possibility that the proposed UK calorie labelling policy will not result in changes to consumer behaviour. However, there are other important mechanisms by which this policy may impact on public health.

Calorie labelling and industry behaviour

One of the most important alternative mechanisms of effect may be via industry reformulation, including portion size reduction and new product development, within the out-of-home sector.

The UK Soft Drinks Industry Levy provides a good example of how a public health policy can influence industry behaviour. This levy on manufacturers and importers of soft drinks has two tiers – a lower one for drinks with more than 5g sugar per 100ml and a higher one for drinks containing more than 8g sugar per 100ml. The levy was announced two years prior to implementation to allow the soft drinks industry time to adjust. Recent evidence indicates substantial reduction in the sugar concentration of the soft drinks market in the months leading up to introduction of the levy, with the percentage of levy-eligible drinks with more than 5g sugar per 100 mL falling from 49% to 15%¹⁴. There was some evidence of manufacturers reformulating ‘to target’ with new peaks in the distribution of sugar concentration across drinks just below each levy threshold¹⁴.

In the context of the out-of-home food sector, mandatory calorie labelling may lead to businesses being required to reveal information to their customers that they consider to be damaging to both their reputation and profits. Potential responses to reduce these risks include reducing the number of calories in existing products, reducing portion sizes, and introducing new, lower calorie products. The most direct evidence in support of these effects is from a meta-analysis of predominantly US studies¹⁵ where the introduction of out-of-home

calorie labelling resulted in significantly fewer calories in the average dish (-15 kcals; confidence intervals not reported).

Importantly from a public health perspective, reducing the calories in available dishes bypasses the requirements for the conscious (i) attention, (ii) understanding and (iii) motivation that is required for calorie labelling to result in consumer behaviour change. Although public health benefits depend on purchasing behaviour and consumption behaviour being aligned and people not compensating with increased calories elsewhere in their diets. Even a relatively small reduction in calories consumed per person via this mechanism could result in valuable benefits to population health when applied to the large proportion of the population who regularly eat outside of the home.

Because many people are in part motivated by health and weight when making dietary decisions¹⁶, other theoretical effects of mandatory out-of-home calorie labelling with the potential to benefit public health include raised awareness of calories consumed not just out-of-home but also elsewhere resulting in changes in purchasing and consumption across the diet; changes to the types of outlets visited (e.g. avoidance of outlets selling very high calorie meals); and reductions in the frequency of visits to out-of-home outlets. These speculative effects have received little, if any, research attention and no attempt has previously been made to consider all of them in concert.

Considering unintended consequences

Uncertainties concerning the likely impacts of mandatory calorie labelling reinforces the need for a wider evaluative perspective than taken previously. This should include unintended consequences with the potential to undermine any beneficial impacts on public health. For example, if calorie reduction is achieved by redesigning recipes, then salt content may consequently increase to maintain palatability¹⁷. Likewise, if mandatory calorie labelling threatens profits (e.g. due to the cost of implementation, as has been suggested by industry groups¹⁸) then businesses may increase marketing to offset this. Even if labelling leads to reduced calories consumed from out-of-home food outlets, if these are substituted elsewhere in the diet then there may be little overall health benefit.

Another potential unintended consequence of mandatory calorie labelling is on health equity. People living in less affluent circumstances are less likely to report considering calories when making food choices¹⁶. Thus, if there are any positive effect of providing calorie information on consumer purchasing behaviour, these may be more exaggerated in more affluent groups and so serve to widen existing socio-economic inequalities in diet and obesity^{11, 19}. However, if diners living in more affluent circumstances are already calorie conscious and avoiding higher calorie options¹⁶, then reformulation may have most benefit for those living in less affluent circumstances and so help to narrow inequalities.

Whilst it may not be practical to consider all of these effects in a single evaluation, the evidence-base to date has lacked a wider perspective on the possible impacts of mandatory calorie labelling on, amongst other things, business behaviour, total diets, and inequalities. As evidence of some impacts (e.g. changes in consumer behaviour) becomes more consistent, researchers should be encouraged to move to focusing on unanswered questions and integrating findings across contexts to determine which findings are and are not generalisable. In Box 1 we highlight research priorities for evaluations of the public health impacts of mandatory calorie labelling in the out-of-home food sector.

Policy context

Even if mandatory calorie labelling does provide a small measurable public health benefit at the population level, it should only ever be considered as one part of a multi-component obesity strategy. Obesity has been a slowly developing public health problem and to date there has been no progress on reducing obesity in the UK. This, alongside the complex and changing nature of the systems that contribute to obesity, means that there are unlikely to be quick fixes. Instead, a wide-ranging portfolio of policies and interventions that evolve over time will be required to bring about reductions in obesity.

It is also important to consider that there are a number of ways in which mandatory calorie labelling could contribute to national and global obesity control efforts beyond the specific mechanisms we have outlined above. Although information provision interventions like food labelling have been criticised by some as being weak public health strategies,²⁰ they could serve to support further policy action. By uniquely surfacing the problem of the energy content of food sold in the out-of-home sector, calorie labelling may prompt further action simply by raising awareness. Further, in a few years, if it is felt that mandatory labelling has led to insufficient gains to public health, this failure itself could prompt further action.

Globally, the only other country to have introduced nationwide mandatory calorie labelling in the out-of-home food sector is the USA. Its introduction in England provides a further case study to enable the generalizability of findings from the USA to be explored. If findings are consistent, this could result in the policy being extended to smaller business in England and inspire other jurisdictions to follow suit, leading to global as well as national impacts²¹. However, if judgements about effectiveness of calorie labelling focus on consumer responses alone and do not consider wider impacts, enthusiasm for wider adoption of mandatory calorie labelling policies may be prematurely cut short.

Conclusions

The current evidence suggests that the UK government's mandatory out-of-home calorie labelling policy may have a modest or no effect on what food people select when eating out. However, considering consumer behaviour responses to calorie labelling alone could lead to incorrect conclusions on the effectiveness of this policy. There are numerous other potential mechanisms through which mandatory calorie labelling could impact public health. Perhaps the most promising of these is industry-led reformulation of existing products and development of new, lower calorie, ones. Few previous evaluations have attempted to capture these wider impacts by taking a more systemic perspective²². The public health research and policy communities should be supported and encouraged to move on from asking what impacts calorie labelling has on consumer behaviour to ask wider questions about its overall effects on population health via a range of mechanisms.

References

1. Kass DA, Duggal P, Cingolani O. Obesity could shift severe COVID-19 disease to younger ages. *Lancet* 2020; 395: 1544-1545
2. England PH. Calorie reduction: the scope and ambition for action. 2018
3. Robinson E, Burton S, Gough T, et al. Point of choice kilocalorie labelling in the UK eating out of home sector: a descriptive study of major chains. *BMC Public Health* 2019;19(1):649.
4. Robinson E, Jones A, Whitelock V, et al. (Over) eating out at major UK restaurant chains: observational study of energy content of main meals. *BMJ* 2018;363:k4982.

5. Theis DRZ, Adams J. Differences in energy and nutritional content of menu items served by popular UK chain restaurants with versus without voluntary menu labelling: A cross-sectional study. *PLOS ONE* 2019;14(10):e0222773.
6. Muc M, Jones A, Roberts C, et al. A bit or a lot on the side? Observational study of the energy content of starters, sides and desserts in major UK restaurant chains. *BMJ Open* 2019;9(10):e029679.
7. Block JP, Condon SK, Kleinman K, et al. Consumers' estimation of calorie content at fast food restaurants: cross sectional observational study. *BMJ* 2013;346:f2907. doi: 10.1136/bmj.f2907
8. Kellershohn J, Walley K, Vriesekoop F. Ontario Menu Calorie Labelling Legislation: Consumer Calorie Knowledge Six Months Post-Implementation. *Can J Diet Pract Res* 2018;79(3):129-32.
9. . Department of Health and Social Care. Consultation on mandating calorie labelling in the out-of home sector. Accessed 18/08/2020 from: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/751529/consultation-on-calorie-labelling-outside-of-the-home.pdf.
10. Crockett RA, King SE, Marteau TM, et al. Nutritional labelling for healthier food or non-alcoholic drink purchasing and consumption. *Cochrane Database of Systematic Reviews* 2018(2)
11. Petimar J, Zhang F, Cleveland LP, et al. Estimating the effect of calorie menu labeling on calories purchased in a large restaurant franchise in the southern United States: quasi-experimental study. *BMJ* 2019;367:l5837.
12. Vasiljevic M, Cartwright E, Pilling M, et al. Impact of calorie labelling in worksite cafeterias: a stepped wedge randomised controlled pilot trial. *International Journal of Behavioral Nutrition and Physical Activity* 2018;15(1):41.
13. Vasiljevic M, Fuller G, Pilling M, et al. What is the impact of increasing the prominence of calorie labelling? A stepped wedge randomised controlled pilot trial in worksite cafeterias. *Appetite* 2019;141:104304.
14. Scarborough P, Adhikari V, Harrington RA, et al. Impact of the announcement and implementation of the UK Soft Drinks Industry Levy on sugar content, price, product size and number of available soft drinks in the UK, 2015-19: A controlled interrupted time series analysis. *PLOS Medicine* 2020;17(2):e1003025.
15. Zlatevska N, Neumann N, Dubelaar C. Mandatory Calorie Disclosure: A Comprehensive Analysis of Its Effect on Consumers and Retailers. *Journal of Retailing* 2018;94(1):89-101.
16. Wardle J, Griffith J. Socioeconomic status and weight control practices in British adults. *Journal of Epidemiology and Community Health* 2001;55(3):185.
17. Leshem M. Biobehavior of the human love of salt. *Neuroscience & Biobehavioral Reviews* 2009;33(1):1-17.
18. Big Hospitality. Accessed 11/11/2020 from: <https://www.bighospitality.co.uk/Article/2020/07/27/Mandatory-calorie-labelling-become-compulsory-for-restaurants-employing-over-250>.
19. Sarink D, Peeters A, Freak-Poli R, et al. The impact of menu energy labelling across socioeconomic groups: A systematic review. *Appetite* 2016;99:59-75.
20. Capewell S, Capewell A. An effectiveness hierarchy of preventive interventions: neglected paradigm or self-evident truth? *Journal of public health (Oxford, England)* 2018;40(2):350-58.
21. Hagenslaars LL, Jeurissen PPT, Klazinga NS. Sugar-sweetened beverage taxation in 2017: a commentary on the reasons behind their quick spread in the EU compared with the USA. *Public health nutrition* 2019;22(1):186-89.
22. Rutter H, Savona N, Glonti K, et al. The need for a complex systems model of evidence for public health. *The Lancet* 2017;390(10112):2602-04.

Table 1: Table Summarising Recent Evidence Reviews

Review	Approach Used	Evidence Summary	Main Conclusions from Text	Countries studies conducted in
Kiszko et al. (2014). <i>Journal of Community Health</i>	Systematic review and narrative synthesis	Ineffective	'Overall the best designed studies show that calorie labels do not have the desired effect in reducing total calories ordered'	USA, Canada
Long et al. (2015). <i>American Journal of Public Health</i>	Systematic review and meta-analysis	Ineffective	'Current evidence does not support a significant impact on calories ordered'	USA
VanEpps et al. (2016). <i>Current Obesity Reports</i>	Narrative synthesis	Unclear	'Overall, the evidence regarding menu labelling is mixed, showing that labels may reduce the energy content of food purchased in some contexts, but have little effect in other contexts'	USA
Bleich et al. (2017). <i>Obesity</i>	Systematic review and meta-analysis	Unclear	'Because of a lack of well-powered studies with strong designs, the degree to which menu labelling encourages lower-calorie purchases and whether that translates to a healthier population are unclear'	USA
Cantu-Jungles et al. (2017). <i>Nutrients</i>	Systematic review and meta-analysis	Ineffective	'Menu labelling away-from-home did not result in change in quantity of calories consumed among U.S. adults'	USA
Crockett et al. (2018). <i>Cochrane Reviews</i>	Systematic review and meta-analysis	Effective	'Findings from a small body of low-quality evidence suggest that nutritional labelling comprising energy information on menus may reduce energy purchased in restaurants'	USA

Reviews summarising the effect of calorie labelling on calories ordered when eating out of the home, published from October 2014 onwards. Where reviews included both laboratory and real-world data, conclusions quoted refer to real-world data only. Note: most studies included in the reviews measure energy ordered and not consumed, so influence on energy consumed (e.g. not consuming all of a very high calorie meal) may differ.

Box 1: Unanswered questions (Q) about calorie labelling in the out of home food sector and examples of research methodology (RM) to address question

Q1) Does calorie labelling have differential effects on calories purchased, based on type of business? e.g. fast-food outlets, full-service restaurants, coffee shops, takeaway food.

RM) Observational research examining purchases pre vs. post implementation in a range of business types introducing calorie labelling (to examine change over time) and if possible in businesses not introducing calorie labelling (to examine change unrelated to introduction of labelling).

Q2) Does calorie labelling have differential effects on calories purchased, based on population sub-groups, such as higher vs. lower SES and healthy weight vs. overweight and obesity?

RM) Field research using customer intercept questionnaire at food outlets (stratified by geographical region to ensure population representativeness) examining purchasing behaviour pre vs. post implementation of calorie labelling.

Q3) What effect does calorie labelling have on other behaviours when eating out? e.g. types of out-of-home food sector businesses visited, frequency of meals consumed in the out-of-home food sector

RM) Survey research examining consumer behaviour and analysis of market trend data pre vs. post implementation of calorie labelling.

Q4) What other effects does calorie labelling have on individuals, away from the out-of-home food sector? e.g. calories consumed away from the out-of-home food sector, physical activity

RM) Analysis of population level data (e.g. National Diet and Nutrition Survey) characterising trends in daily energy intake and physical activity pre vs. post implementation of calorie labelling.

Q5) In what ways does calorie labelling impact on industry behaviour? e.g. product reformulation and introduction of new products and changes to marketing of products

RM) Surveillance work characterising nutritional content of products (through self-reported nutrition information from businesses or laboratory measurement) being sold in the out-of-home sector pre-post implementation and out-of-home sector marketing activities.

Q6) What are the wider impacts of calorie labelling on industry (e.g. economic implications)?

RM) Macro and micro economic evaluation of calorie labelling interventions