Title: Has a public-private partnership resulted in action on healthier diets in England? An analysis of the Public Health Responsibility Deal food pledges

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Abstract

The Public Health Responsibility Deal (RD) in England is a public-private partnership involving voluntary pledges between government, industry and other organisations in the areas of food, alcohol, physical activity, and health at work, and is designed to improve public health. The RD is currently being evaluated in terms of its process and likely impact on the health of the English population. This paper analyses the RD food pledges in terms of (i) the evidence of the effectiveness of the specific interventions in the pledges and (ii) the likelihood that the pledges have brought about actions among organisations that would not otherwise have taken place. We systematically reviewed evidence of the effectiveness of the interventions proposed in six food pledges of the RD, namely nutrition labelling (including out-of-home calorie labelling and front-of-pack nutrition labelling), salt reduction, calorie reduction, fruit and vegetable consumption, and reduction of saturated fats. We then analysed publically available data on organisations' plans and progress towards achieving the pledges, and assessed the extent to which activities among organisations could be brought about by the RD. Based on seventeen evidence reviews, some of the RD food interventions could be effective, if fully implemented. However the most effective strategies to improve diet, such as food pricing strategies, restrictions on marketing, and reducing sugar intake, are not reflected in the RD food pledges. Moreover it was difficult to establish the quality and extent of implementation of RD pledge interventions due to the paucity and heterogeneity of organisations' progress reports. Finally, most interventions reported by organisations seemed either clearly (37%) or possibly (37%) already underway, regardless of the RD. Irrespective of the nature of a public health policy to improve nutritional health, pledges or proposed actions need to be evidence-based, well-defined, and measurable, pushing actors to go beyond 'business as usual' and setting out clear penalties for not demonstrating progress.

Introduction

Diet plays an essential role in influencing the risk of major non-communicable diseases (NCDs) and poor diet incurs high costs to individuals and health services. Moreover there are considerable and widening inequalities, both in the consumption of healthy diets and in nutrition-related diseases. Recommendations for addressing nutrition-related NCDs increasingly focus on intervening across a range of sectors, particularly prioritising supply side policies to curb caloric availability and improve affordability (WHO, 2013).

The most recent data suggest that the English population consumes excessive saturated fat, added sugars and salt (Bates et al., 2014). The current response of the Government in England hinges upon the "Reducing Obesity and Improving Diet" policy (Department of Health, 2013), which includes helping people make healthier choices through the public-facing Change4Life programme, the flagship Public Health England healthy lifestyle social marketing campaign, and encouraging food companies and other actors to contribute to improving public health through the Public Health Responsibility Deal (RD).

The RD was launched in March 2011 by the Department of Health as a national level public–private partnership with the overall aim of improving public health. It involves voluntary agreements between the Government and the corporate sector, academia and voluntary organisations who can commit to a range of pledges in the areas of food, alcohol, physical activity and health at work (Department of Health, 2014). At time of writing (April 2015), 781 organisations had committed to the RD pledges (across all networks).

The involvement of industry in food and nutrition policymaking by past UK Governments has been criticized (Caraher et al., 2009) and is one of the more controversial aspects of the RD (Panjwani and Caraher, 2014). There can be benefits and opportunities from public-private partnerships (Kraak et al., 2012), as demonstrated by the headway made over the last decade by the food industry in voluntarily reducing salt content from processed foods sold in the UK (FSA, 2013, Griffith et al., 2014). However there are risks and challenges from a public health perspective, as increasingly illustrated by independent evaluations of public-private partnerships (Ng and Popkin, 2014, Ng et al., 2014). The involvement of the food industry in public health has raised a number of concerns about the motivations and effectiveness of such partnerships in meeting health objectives (Moodie et al., 2013).

This paper analyses the RD food pledges in terms of (i) the evidence on the effectiveness of specific interventions within pledges and (ii) the likelihood that the pledges have brought about actions among organisations that would not otherwise have taken place. This paper is part of a wider

evaluation (Bryden et al., 2013, Petticrew et al., 2013, Knai et al., 2015, Knai et al., 2015) which is drawing on publically available data, interviews and case studies.

Methods

Rationale for analysing six food pledges

We focused on six (Table 1) out of the eight RD food pledges as at the end of 2013 (Department of Health, 2014): out-of-home calorie labelling, salt reduction, calorie reduction, front-of-pack nutrition labelling, fruit and vegetable consumption, and saturated fats. We excluded salt in the catering trade because it is on the whole covered under the salt reduction pledge. A separate analysis of the trans fats pledge is currently underway.

[insert Table 1]

Evidence synthesis

We first considered the RD food pledges in the broader context of existing diet-related interventions using the World Cancer Research Fund's NOURISHING 'Framework of food policies to promote a healthy diet' (Table 2) (Hawkes et al., 2013). This framework is consistent with, and supportive of, the list of policy options included in the WHO's Global Action Plan for the Prevention and Control of Non-Communicable Diseases (2013–2020) (WHO, 2013).

[insert Table 2]

We then conducted a synthesis of reviews (Smith et al., 2011) specifically on the effectiveness of interventions described in the six RD food pledges to reduce food consumption or otherwise change dietary behaviours and/or increase awareness or knowledge related to healthy food consumption. We included both systematic and other, less systematic reviews published in any year, in order to include the most up to date evidence. We categorised them as follows, according to the strength of evidence they presented:

1) Level 1= systematic reviews, defined as an exhaustive summary of the literature on a particular topic (KCL, 2014), typically involving an a priori comprehensive search strategy, with the goal of reducing bias by identifying, appraising, and synthesizing all relevant studies on a particular topic (Uman, 2011);
2) Level 2= reviews not meeting core criteria for systematic reviews i.e. evidence of comprehensive search, clear selection (inclusion/exclusion) criteria and a process of quality assessment of papers reviewed. This latter group was therefore weaker methodologically, but was taken to represent "suggestive evidence".

A standardised search strategy for systematic reviews was developed and applied to the following databases, for publications to August 2014: the Centre for Reviews and Dissemination's Database of Abstracts of Reviews of Effects (DARE), which is the largest source of quality assessed systematic reviews, including records of all Cochrane reviews and protocols; PubMed; and the Database of Promoting Health Effectiveness Reviews (DoPHER). We also conducted an Internet search for unpublished systematic reviews. A PRISMA flow diagram of the review screening process is presented in Figure 1. Finally, where there was no recent or relevant systematic review, we searched for individual primary studies evaluating the effectiveness of the relevant intervention. Relevant data were extracted from the selected reviews and studies. A narrative synthesis of the data was conducted, organised by pledge. The quality of each review was assessed using the Measurement Tool to Assess Systematic Reviews (AMSTAR), a well-established instrument to rate the quality of systematic reviews, and reported in Table 3 (Shea et al., 2009).

[insert Figure 1]

Analysis of organisations' pledges

Upon committing to a pledge, organisations are asked to provide a delivery plan, setting out how they will meet the pledge objective. Signatories are then asked to report their progress in the spring of each year, and in principle the food pledge delivery plans and progress reports are made publically available on the RD website (Department of Health, 2014). In November 2013, we collated these reports into spreadsheets, which included the names, dates of joining, delivery plan text, progress report text, individual interventions as proposed in the pledge document, and an assessment of 'additionality' (explained below). We set out to 1) assess the activities committed to by organisations in relation to six food pledges; 2) evaluate to what extent an activity could be credited to the RD; and 3) evaluate progress on delivery by analysing annual progress reports.

We sought to minimise bias in the process by 1) pilot testing our data extraction tool to remove potential inconsistencies between raters before the main rating began; 2) considering a delivery plan to be a statement of intent by organisations, and progress reports to be a statement of achievements, to be taken at face value; 3) rating the delivery plans independently first (blind ratings) followed by 4) discussion and agreement in pairs and with a third rater in the event of disagreement); and 5) rotating the pairs of raters so that pair A-B coded delivery plans in pledge A1, Pair B-C coded delivery plans in pledge A3, and so forth.

Interventions proposed in each organisation's delivery plan

Each pledge document outlines a range of possible interventions (such as front-of-pack labelling) that a partner can choose to implement to deliver the pledge. We calculated the proportion of

organisations planning to address certain interventions in their delivery plans by dividing the number of organisations who indicated that they were planning on implementing a specific intervention by the total number of organisations who signed up to that pledge.

The use of 'additionality' to establish the counterfactual

Traditionally an impact evaluation seeks to establish that the intervention has caused the effects observed and uses a counterfactual design to do so (i.e. to provide an estimate of what would have occurred without the intervention) (Hind, 2010). However attributing causality to public policies that are implemented across an entire jurisdiction can be difficult because there is no obvious comparator (Hind, 2010, White, 2010). The counterfactual can also be constructed qualitatively by judging so-called 'additionality', an approach which has been used to assess whether projects or initiatives add value (Heinrich, 2014). In this study, we employed the concept of additionality to help establish the counterfactual; that is, additionality is defined in this analysis as the extent to which we judged that a planned or completed activity could have been brought about by the RD, as opposed to an activity which would have happened anyway, or which appeared to be already happening irrespective of the RD. The counterfactual was derived from assessing organisations' delivery plans to ascertain what actions organisations would have taken in the absence of the RD.

We developed criteria for judging the level of 'additionality' in line with the Public Health Outcomes Framework's assessment criteria for indicators (Department of Health, 2012, Department of Health, 2013), coded from 1 to 5, where: "1" is assigned if all interventions mentioned were judged by assessors to be a result of the RD. A fictional example is *"We will deliver this pledge by increasing the vegetable content of our dishes by 10% by December 2013";* "2" if planned interventions (excluding those stated to be already completed) were judged by assessors to be potentially due to the RD. For example, *"In 2012 we reduced saturated fat in 80% of our products and we pledge to continue working at reducing saturated fats over the next year to achieve 100% reduction";* "3" if it was judged that all interventions were already implemented and/or not related to the RD. For example "*We have already achieved this pledge. We have been reducing calories in our products for years.";* "4" if there was not enough information provided to make a judgement; and "5" if no delivery plan was provided by the signatory. In practice, as noted above, delivery plans were considered to be a statement of intent by organisations and were taken at face value. This meant that our judgements erred in favour of identifying greater additionality.

The validation of the additionality coding scheme is reported elsewhere (Knai et al., 2015): it was considered a valid approach to judging additionality, with 96% of 2013 progress reports judged as being consistent with the initial delivery plan.

Analysis of progress on delivery of plans

We conducted a comparative analysis of progress reports provided for the food pledges in 2012, 2013 and 2014, and assessed any changes over time, and in relation to what was originally set out in delivery plans. However, progress reports were very inconsistently provided on the RD website and mostly unavailable. Since 2013 they have been submitted online, and we were informed by the Department of Health that progress reports for 2013 were overwritten for all pledges, where organisations had provided progress reports in 2014. Moreover only the out-of-home calorie labelling pledge and salt reduction pledge still have 2012 progress reports. They were initially listed on spreadsheets and available for download, then mostly removed and replaced with the statement "Annual updates for 2012/13 and 2013/14 can be accessed from the list of organisations below", and at the time of publication (April 2015) it now appears that annual reports have been collated and uploaded as PDFs. Also, only a proportion of signatories to the out-of-home calorie labelling pledge had provided 2014 progress reports by October 2014, and so some still displayed progress reports from 2013. Finally, no delivery plans were required by those signing onto the front-of-pack nutrition labelling pledge (launched in June 2013). Therefore we assessed any available progress reports of organisations who were judged to demonstrate clear or potential additionality (coded "1" or "2").

Results

Who signed up to the RD food pledges?

Most (95%) organisations signing up to the food pledges under analysis were from the private food sector, including retailers, manufacturers, caterers and food outlets (such as restaurant chains). For the calorie reduction, front-of-pack labelling and saturated fat pledges, 100% of organisations were from the food sector. The other sectors represented across the food pledges under analysis included the education, voluntary and health sectors, and accounted for 5% of signatories to the food pledges under analysis, i.e. 13 out of 253 organisations.

What interventions did organisations list in their delivery plans?

The different interventions proposed as part of the six pledges are listed in Table 1, along with the proportion listed by organisations in their delivery plans. Thus for example, the most common intervention out-of-home calorie labelling pledge intervention was the provision of information on calories at point of choice with 51%, or 25 organisations, pledging to do so. The most common intervention in the salt reduction pledge involved reformulation activities (46%). Reformulation of recipes and menus was also the most commonly listed intervention in the calorie reduction pledge

(64%). Prominently promoting fruit and vegetables in retail and communicating with customers (26%) was the most commonly listed fruit and vegetable pledge intervention chosen. As signatories to the front-of-pack labelling pledge were not required to provide a delivery plan, we were unable to determine which of the interventions were preferred. Signatories to the front-of-pack labelling pledge were required to adopt and implement the UK guidance specifying the format and content of front-of-pack labels by December 2014. Finally the most common intervention listed as part of the saturated fat reduction pledge involved the reformulation of products to achieve absolute reductions in saturated fat levels or substitute saturated fats for unsaturated, avoiding concomitant increases in trans-fat levels (54%).

What is the evidence that these interventions will have a positive effect on diet behaviours?

Putting the RD pledges in context: an overview of the broader evidence

Table 2 summarises the evidence on effectiveness of diet-related interventions, according to the World Cancer Research Fund NOURISHING Framework, putting the RD food pledges in the context of the broader evidence. Measures to improve the food environment, such as pricing policies and marketing restrictions, and encouraging a combination of coordinated, complementary approaches across the spectrum of policy interventions, are considered the most effective at improving diet and related behaviours (Mozaffarian et al., 2012).

Evidence underpinning nutrition labelling interventions (pledges F1 and F7)

The evidence underpinning specific interventions described in the six RD food pledges is summarised in Table 3 and detailed here below.

[insert Table 3]

Out-of-home calorie labelling

We identified six reviews on out-of-home calorie labelling (three Level 1 (Swartz et al., 2011, Mozaffarian et al., 2012, Kiszko et al., 2014) and four Level 2 (Holdsworth and Haslam, 1998, Seymour et al., 2004, Stran et al., 2013)). Kiszko et al (2014) and Swartz et al (2011) built on a 2008 review (Harnack and French, 2008) and supported the findings that calorie labels do not appear to have the desired effect in reducing total calories ordered at the population level. These findings were echoed by Mozaffarian et al (2012). Stran et al (2013), Seymour et al (2004) and Holdsworth & Haslam (1998) reported more promising but mixed findings of labels on choices and purchasing behaviour of customers in restaurants.

Front-of-pack labelling

Five reviews (five Level 1 (Cowburn and Stockley, 2005, Grunert and Wills, 2007, Campos et al., 2011, Mozaffarian et al., 2012, Hersey et al., 2013) and one Level 2 (Hawley et al., 2012)) summarise the evidence underpinning front-of-pack labelling. Three reviews (Cowburn and Stockley, 2005, Grunert and Wills, 2007, Campos et al., 2011) focused specifically on consumer understanding of front-of-pack labels and largely agree that consumers are likely to look at a label without processing the information further and therefore the influence of labels on choices was likely to be limited. Moreover Hersey et al (2013) found that consumers understand symbols more easily than numeric information. Cowburn & Stockley (2005) also suggest that label use may contribute to increasing dietary inequalities as it is considerably lower among poorer individuals and people with little nutritional knowledge and health literacy. Mozaffarian et al (2012) also found that people who are more aware of health concerns are more likely to report using the front-of-pack labels and purchasing products with labels. Natural experiments are cited (Hawley et al., 2012, Mozaffarian et al., 2012) which suggest that nutritional labelling may potentially influence industry to reformulate products by reducing or removing salt (Young and Swinburn, 2002, Vyth et al., 2010), saturated fats and added sugars (Vyth et al., 2010), and trans fats (Ratnayake et al., 2014).

Evidence underpinning salt reduction intervention

One Level 1 review (Mozaffarian et al., 2012) relevant to the salt reduction pledge was identified. The authors report on the effectiveness of salt reduction programmes including working with food provision services and businesses. The UK Food Standards Agency's salt reduction programme began in the early 2000s, combining public awareness campaigns with voluntary agreements from industry to reformulate products. It has resulted in a 16% decrease in the average intake of salt (Sadler et al., 2012).

Evidence underpinning calorie reduction interventions

As noted above, product labelling with nutritional information can motivate producers to reformulate their product, including removing or reducing sources of energy such as fats and sugars. In terms of reducing calories in options and menus on offer, two reviews (both Level 1 (Skov et al., 2013, Small et al., 2013)) were included. Skov et al (2012) reviewed five studies evaluating interventions which manipulate portion size, four of which found some association between container or cutlery size and consumption volume. However the authors caution against drawing any conclusions from these studies given their heterogeneity. Small et al (2013) also evaluated the effectiveness of interventions to manipulate portion sizes or to educate about portion size; they concluded that three studies focused on adults found that they were able to accurately estimate portion size followed education and training.

Evidence underpinning interventions to increase fruit and vegetable consumption

Four reviews (all Level 1 reviews (Glanz and Yaroch, 2004, Knai et al., 2006, Mozaffarian et al., 2012, Escaron et al., 2013)) of studies to increase fruit and vegetable promotion were included. Escaron et al (2013) reviewed the evidence on supermarket and grocery store interventions to promote healthy food choices, such as displaying fruit and vegetables in a kiosk; they found moderate effectiveness of interventions on customer purchasing behaviour. Mozzafarian et al (2012) reviewed evidence of media campaigns such as the 5-a-day campaign on purchase and consumption, finding that long-term, targeted awareness campaigns had some success at increasing knowledge and behaviour. Knai et al (2006) also concluded that the most effective ways of getting children to eat fruit and vegetables were hands-on exposure to fruit and vegetables, developing preparation skills and taste testing, active participation of food service staff, and active involvement of parents, teachers and the wider community, including food producers and retailers. Glanz & Yaroch (2004) reported promising evidence that increasing availability and convenience of food items may be effective strategies to increase fruit and vegetable purchases, as can be providing price promotions (such as coupons).

Evidence underpinning saturated fats reduction intervention

Four reviews (one Level 1 (Mozaffarian et al., 2012) and three Level 2 (Ammerman et al., 2002, Seymour et al., 2004, Goodman and Anise, 2006)) were included. Seymour et al (2004) reported that providing information and low-fat options at point of purchase was a promising way to influence purchases and reduce consumption of saturated fat, as was training food service staff and modifying menus. Mozaffarian et al (2012) refers to the experience of Finland which saw a combination of voluntary agreements with industry to increase production of foods low in saturated fat, modifications of taxation and restrictions on milk fat, resulting in an overall decline in energy derived from saturated fats. Goodman and Anise (2006) reviewed the evidence on the effectiveness of economic instruments including taxes, price policies and incentives in reducing consumption of foods high in saturated fats and suggested that a causal relationship between policy-related economic instruments and food consumption is plausible, based on indirect evidence. For example one longitudinal study found that increases in the price of unhealthy foods were associated with decreased consumption of foods high in saturated fat. Ammerman et al (2002) reviewed behavioural interventions to modify dietary fat and found that consistent decreases in saturated fat intake were observed.

4. What is the likelihood that the Responsibility Deal motivated action on diet? "Additionality" of the RD food pledges

We counted 312 occasions in delivery plans when organisations listed interventions related to the RD food pledges. Of these, 82 interventions (26%) were judged to be likely brought about by the RD; 116 interventions (37%) were potentially brought about by the RD; and 114 interventions (37%) were assessed either as having already happened, or already underway when the RD started (Figure 2).

We further disaggregated interventions judged as having been motivated by the RD. For example, in the case of out-of-home calorie labelling, although providing information on calories at point of choice was the most often selected intervention in the delivery plans (Table 1), only 4% were judged as being motivated by the RD, meaning that there is a strong likelihood that most organisations choosing this intervention had already implemented it regardless of the RD. Similarly, nearly half (46%) of signatories to the salt reduction pledge listed reformulation as part of their plan to meet the pledge, however 0% were judged as having been motivated by the RD to do so.

[insert Figure 2]

Signatories' progress

We selected the delivery plans which had indicated clear (code "1") or potential (code "2") 'additionality' of the RD (which would therefore presumably have some progress to report), and analysed the available progress reports. The 2012 reports were only available for the out-of-home calorie labelling and salt reduction pledges.

Reports on the out-of-home calorie labelling pledge were provided by about half of potential respondents in 2014, and five were still using the 2013 progress reports. However of the progress reports where comparison was possible (n=9), all demonstrated some progress in 2014 against 2012, reporting on various indicators: for example six organisations reported on the proportion of standardised food and drink product lines and on what this represented in terms of outlets, both for 2012 and 2014 (Table 4). One showed a dramatic drop in the proportion of food outlets providing out-of-home calorie labelling, though it is difficult to know whether this is a true reflection of events, or artefactual, for example where outlets may have been defined differently or more specifically in 2014 compared to 2012.

[insert Table 4]

Signatories to the salt reduction pledge were asked to provide information on how many of the 80 salt target categories fell within their product range, the proportion met, and the proportion not yet met but on track to achieve the target (Table 5). We aimed to provide an indication of trends over time of meeting the salt targets. However as demonstrated in Table 5, the provision of data is incomplete and therefore this could not be assessed further.

[insert Table 5]

Partners signing onto the calorie reduction pledge were encouraged to describe progress made in meeting the pledge, but the monitoring questions were both vague, and voluntary, e.g. “You may wish to give a comparison with activity undertaken prior to signing up to the pledge or a reference to where this is captured elsewhere, e.g. in a separate monitoring form detailing previous actions or a separately prepared report”. (Department of Health, 2014) A single organization provided such a report. Others gave some details on actions, including reformulation of products, new product development, consumer information through labelling and other approaches, and partnerships with schools (for example, providing information leaflets, teacher resource toolkits and cooking classes). Overall, reporting on calorie reduction was vague and unsubstantiated, with only a small minority of partners reporting specific changes over time as well as the market share of lower calorie options or reformulated products. Where details were provided, it was impossible to ascribe those reductions to participation in the RD.

Reporting requirements for the fruit and vegetable pledge included a request for the number of stores and outlets involved in meeting the pledge actions. However this was not uniformly answered and it was impossible to ascertain the extent of, for example, a reformulated product or modified recipe, because no such detail was required.

Finally, reporting on progress to meet the saturated fat pledge was at times reported in the calorie reduction pledge; again, though some details were provided, it was impossible to ascribe progress to the RD, and data showing progress over time were not available.

Discussion

The majority of the RD food pledges propose interventions that favour information provision, awareness raising and communication with consumers which may have limited effect (Table 1), but the pledges which propose structural changes such as reformulation of menus or of products themselves could contribute to improving diet in England, if fully implemented. However this conclusion comes with two important caveats: first, our assessment of the potential effectiveness of RD pledges will likely represent an overestimate, because we assumed that any pledge would be implemented to a similar standard as relevant interventions evaluated in the studies reviewed here. As shown in our analysis of the RD delivery plans, we know that this is unlikely to be the case. For example, though reformulation was most commonly listed in the delivery plans, the act of signing up to the RD motivated few organisations to implement such interventions. Second, it is well-

established that interventions which improve information and awareness of health issues or risks do not necessarily translate into positive behavioural change. Individuals also require skills, resources and motivation to change their behaviour, and information provision needs to be coupled with other interventions to be effective (Contento, 1995).

The NOURISHING Framework of food policies to promote healthy diets (Hawkes et al., 2013) highlights several evidence-based policy interventions that are currently absent from the RD food pledges.

Firstly, a focus on sugar intake is absent from the RD food pledges, though now high on the health science and policy agenda, as illustrated by the recent WHO-led public consultation on the update of guidelines on intake of sugars (WHO, 2014, WHO, 2014). It is assumed that the calorie reduction pledge includes efforts to reduce sugar as well, however this is not made explicit as it is for other pledges focusing on specific problematic nutrients, such as the salt and saturated fat reduction pledges. The evidence of the effect of sugar consumption on obesity, diabetes type 2 and dental caries is well-established (Te Morenga et al., 2013, Moynihan and Kelly, 2014) and there is therefore good evidence that an explicit focus by industry members on reducing sugars in processed and pre-packaged foods could have a positive impact on public health. Though RD partners claim that considerable sugar reduction has occurred under their calorie reduction pledge (FDF, 2015), the current progress reports do not substantiate these claims. Moreover, existing data on food expenditure indicate that between 2006 and 2014, the number of calories in the food and drink bought for home consumption by British households increased by nearly 12%, with sugar purchases up by 11% (Kantar, 2014).

Secondly, interventions aimed at reducing the marketing of less healthy foods, particularly packaged or processed foods that are high in fat, sugar and/or sodium which have shown to be an effective public health intervention (Mozaffarian et al., 2012), are absent. Food and beverage marketing influences consumer food purchasing and consumption behaviour, as suggested by the large marketing investments made by food companies (The Federal Trade Commission, 2008). The effect of food promotion via a range of media is evidenced by a series of large scale systematic reviews (Cairns et al., 2009). Several RD partners have reported partnerships with schools, as part of their approach to meet the calorie reduction pledge. This is an important opportunity for food manufacturers and retailers to increase brand recognition among young individuals, under the guise of nutrition education, and there are strong arguments to support schools remaining devoid of food and drink marketing (Nestle, 2002, Sharma et al., 2010, Knai et al., 2011).

Thirdly, pricing policies are only mentioned under the fruit and vegetable pledge. However the evidence for pricing policies to encourage healthy choices is growing, including providing subsidies or incentives for healthy foods and increasing the price of fast food and sugar-sweetened beverages (Powell et al., 2013). Modelling studies of the estimated association between food pricing strategies and changes in food purchases and consumption show an association with beneficial dietary change (Eyles et al., 2012).

Successful voluntary agreements require the most effective interventions, with early involvement of a wide range of stakeholder including the public and civil society organisations for pledge targets to be meaningful (Bryden et al., 2013). As it stands, the majority (95%) of signatories to the food pledges under analysis were from the corporate food sector, including retailers, manufacturers, caterers and food outlets. Several key health organisations either decided not to join the RD at all (RCP, 2011) or left the RD early on (Blainey, 2013) because of the aforementioned concerns. The corporate actors signing onto the food pledges comprise major players in the food system, with a considerable share of the market, and therefore have the potential to affect a major proportion of the population. However the current nature and formulation of the RD food pledges is such that pledge implementation is unlikely to have much effect on nutrition-related health in England.

The most common interventions mentioned in the original delivery plans (2011) included providing labelling information at point of choice, actively promoting fruit and vegetables in store, and reformulating products, recipes and menus to reduce salt, calorie and saturated fat content. This initially appeared to be a very promising finding in terms of the impact of the RD until we assessed the interventions in terms of the RD's 'additionality' and found that only 26% of these interventions were judged to be likely brought about by participation in the RD.

In the case of the RD food pledges, progress reports were mostly unavailable, and where provided, very incomplete, making it difficult to evaluate whether targets were being met. A voluntary agreement such as the RD is likely to be weakened by an optional reporting system; it is in the interest of RD partners themselves to demonstrate measurable progress over time.

There have been calls for greater accountability of key actors in food systems, involving recognition of achievements but also applying sanctions for poor performance or non-compliance (Swinburn et al., 2015). This echoes our review of voluntary agreements (Bryden et al., 2013) which highlights the importance of designing well-defined, quantitative targets which are evidence-based and push partners to go beyond 'business as usual'; active involvement of the public and civil society organisations in the development and monitoring of the pledges; and setting out clear incentives and sanctions for not demonstrating progress against the targets (Bryden et al., 2013). Regardless of

the nature of a public health policy to improve nutritional health, the above criteria need to be met for it to have any considerable effect on population health.

Limitations

There may be unpublished or ongoing reviews we did not locate; the International Prospective Register of Systematic Reviews (PROSPERO) (http://www.crd.york.ac.uk/PROSPERO/) indicated several reviews which would have been relevant but were not yet completed (Hillier-Brown et al., 2013, Wilson et al., 2013). Also, variable reporting standards are an important limitation of any evaluation of the RD, and generally poor quality reporting has made it difficult to provide more systematic assessments of organisations' progress. Finally, although we took every precaution to design and validate our assessment methods, these are based on a judgement of delivery plans which were written by organisations which may not initially have received much guidance on what to write and how to write their plans. Thus it is possible, though we believe unlikely, that organisations under-played their achievements.

Conclusions

The evidence suggests that some of the interventions proposed by the RD can contribute to improving the diet of the English population, if fully implemented. Implementation of interventions was difficult to establish given the paucity and heterogeneity of progress reports, warranting efforts to greatly improve progress reporting both in terms of internal consistency and inclusion of metrics. Moreover most interventions reported by organisations seemed either clearly or possibly already underway, regardless of the RD. Finally many interventions likely to be most effective in improving diet are not consistently reflected in the RD food pledges. These include food pricing strategies, restriction on marketing across the range of media and a specific focus on reducing sugar intake.

Author contributions

CK conceived, designed and planned the study, and led the production of the manuscript. MP, EE, NM, and MAD participated in study design. CK, LJ, AM, MP and CS contributed to data collection and CS and MP contributed to data analysis. All authors contributed to manuscript revisions.

Competing interests

None declared.

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Tables and figures

Table 1. Interventions proposed in six RD food pledges, and the number and proportion of interventions listed by organisations in their delivery plans*

Pledge (# signatories)	**Interventions proposed in each pledge**	**Proportion of organisations signing onto pledges which list these interventions in their delivery plans**	
		#	**%**
Pledge F1- out-of-home calorie labelling (49 signatories)	Information on calories at point of choice (menu boards in quick service restaurants and/or on menus or shelf edging in other types of business, or other points that are equally effective)	25	51%
	Reference information on calorie requirement	12	24%
	Information on calories per portion/item/meal	10	20%
	Information on calories for standardised food and drink items sold ('standardised' is defined as a product that is offered for at least 30 days in a year)	8	16%
	Information on the number of portions for multi portion or sharing items	1	2%
Pledge F2 Salt reduction (81 signatories)	Reformulation	37	46%
	Food service providers will need to procure products that meet the targets and ensure any meals they prepare meet the relevant targets.	23	28%
	Food service providers can adapt their cooking practices and menu planning to reduce salt in the food they serve	13	16%
	Businesses can provide information to customers to help them make healthier choices to reduce salt.	10	12%
	Businesses can share information on best practice and technical developments in salt reduction, especially from the larger businesses to the small and medium enterprises, so that progress is made across all sectors.	8	10%
	Businesses can work to influence the wider European and world agendas to encourage salt reduction initiatives, thereby influencing salt levels in foods imported into the UK.	0	0%
Pledge F4 calorie reduction (36 signatories)	Reformulation of recipes and menus	23	64%
	Encouraging consumers to choose healthier options	21	58%
	Development of lower calorie options	20	56%
	Balance of portfolio/ menu/ etc to include a greater proportion of 'healthier' products	16	44%
	Reduced portion size	14	39%
	Inform and educate consumers towards making healthier choices e.g. funding healthier eating sessions in local schools	12	33%
	Other e.g. innovative use of loyalty cards	3	8%
	Increasing the content of satiety enhancers e.g. fibre	2	6%
	Food retailers can promote fruit and or vegetables more prominently in-store and in communications with customers	10	26%

Pledge (# signatories)	Interventions proposed in each pledge	Proportion of organisations signing onto pledges which list these interventions in their delivery plans	
		#	%
Pledge F6 Fruit and vegetables (38 signatories)	Any sector can promote the 5 a day message at point of sale, on menus and on packs	7	18%
	Improving availability of fruit and or vegetables through promotions, for example meal deals in workplace restaurants	6	16%
	Food retailers can take action to make fruit and or vegetables (including frozen, canned, dried) more affordable, for example through promotions or value ranges	5	13%
	Food manufacturers/suppliers can provide recipe suggestions that incorporate fruit and or vegetable on/in product packs	3	8%
	Food manufacturers/suppliers can reformulate composite products to increase fruit and vegetable content, e.g. ready meals	2	5%
	Any sector can provide advice to consumers on how to cook fruit and vegetables, and incorporate them into meals prepared at home e.g. tip cards	3	8%
	Caterers can provide more prominence to vegetable or salad side dishes on menus, actively up selling these at point of sale or including as integral part of main menu item	2	5%
	Food retailers can increase the range of "ready to cook" and pre-prepared vegetables available in retail settings	1	3%
	Caterers can increase fruit and or vegetable content in appropriate dishes	1	3%
	Food manufacturers/suppliers can develop new fruit and vegetable based products including composite products.	0	0%
Pledge F7a) Front-of-pack nutrition labelling* (20 signatories)	incorporate the introduction of front-of-pack nutrition labelling into their re-labelling schedule by Dec 14	0	0%
Pledge F7b) Front-of-pack nutrition labelling* (16 signatories)	Undertake consumer awareness work e.g. Website information;	0	0%
	Undertake consumer awareness work e.g. in store information and promotion	0	0%
	Undertake consumer awareness work e.g. Recipe cards, booklets and magazine articles	0	0%
	One to one or small group sessions incorporated into wider education programmes or counselling on diet and health.	0	0%
Pledge F8. Saturated fat reduction (13 signatories)	Focus reformulation efforts to achieve absolute reductions in saturated fat levels, substitution of saturated fats by unsaturated fats, and not result in increased trans fats levels.	7	54%
	Providing dietary advice to consumers	5	38%
	Running consumer awareness campaigns	3	23%
	Undertaking surveys of food composition.	0	0%

[a]as at November 2013

*F7(a)= adopt and implement the UK Governments' 2013 recommended Front-of-pack Nutrition Labelling Scheme

*F7(b) = promote, and explain to consumers how to use the UK Governments' 2013 recommended Front-of-pack Nutrition Labelling Scheme

Source for details and pledges and interventions: Department of Health 2014(Department of Health, 2014)

Table 2. The range of nutrition policy options according to the World Cancer Research Fund NOURISHING Framework, evidence of their effectiveness in improving diets, and where the RD food pledges are situated among them.

		Policy area	Example of potential policy intervention	Direction of effect	RD food pledges
N	**FOOD ENVIRONMENT**	Nutrition labelling	Nutrient lists on food packages (front-of-pack labelling)	↔	**F1**
			Menu, shelf labels (out-of-home nutrition labelling)	↑	**F7**
O		Offer healthy foods and set standards in key settings	FV programmes, Standards in key settings, Award schemes	↑	
			Encouraging customers to make healthier options e.g. through choice architecture	↔	**F2, F4**
U		Use economic tools and incentives	Subsidies for healthful foods and beverages	↑	
			Price promotions at point of sale	↑	
			Health-related food taxes	↔	
R		Restrict advertising & commercial promotions	Restrict advertising in all forms of media; sales promotions	↑	
I		Improve food supply	Reformulation to reduce salt and fats	↑	**F2, F8**
			Portion size limits	↑	**F4**
S		Set incentives for healthy community retail environment	Incentives for shops to locate in underserved areas, planning restrictions	↑↑	
			In-store promotions	↑	**F6**
H	**FOOD SYSTEM**	Harness supply chains and actions across sectors	Supply-chain incentives for production; Health-in-all policies; Multi-sectoral engagement	↑↑	
I	**BEHAVIOUR CHANGE & COMMUNICATION**	Inform people	Provide information to customers	↔	**F2, F7**
			Public information campaigns	↑	**F8**
			Onsite supermarket education healthier purchases	↑	
N		Nutrition advice and counselling	Nutrition advice for at-risk individuals clinical guidelines	↑	**F8**
G		Give nutrition education and skills	Nutrition, cooking/food production skills on education curricula; workplace health schemes; health literacy programmes	↑	**F4, F6**

Legend: * ↑↑= effective; ↑= probably effective; ↔= No, weak or inconclusive evidence; ↓= probably ineffective; ↓↓= ineffective

Source: adapted WCRF NOURISHING Framework;(Hawkes et al., 2013) Evidence drawn from(Brambila-Macias et al., 2011, Capacci et al., 2012, Mozaffarian et al., 2012, Powell et al., 2013)

Figure 1. PRISMA flow diagram of review screening process

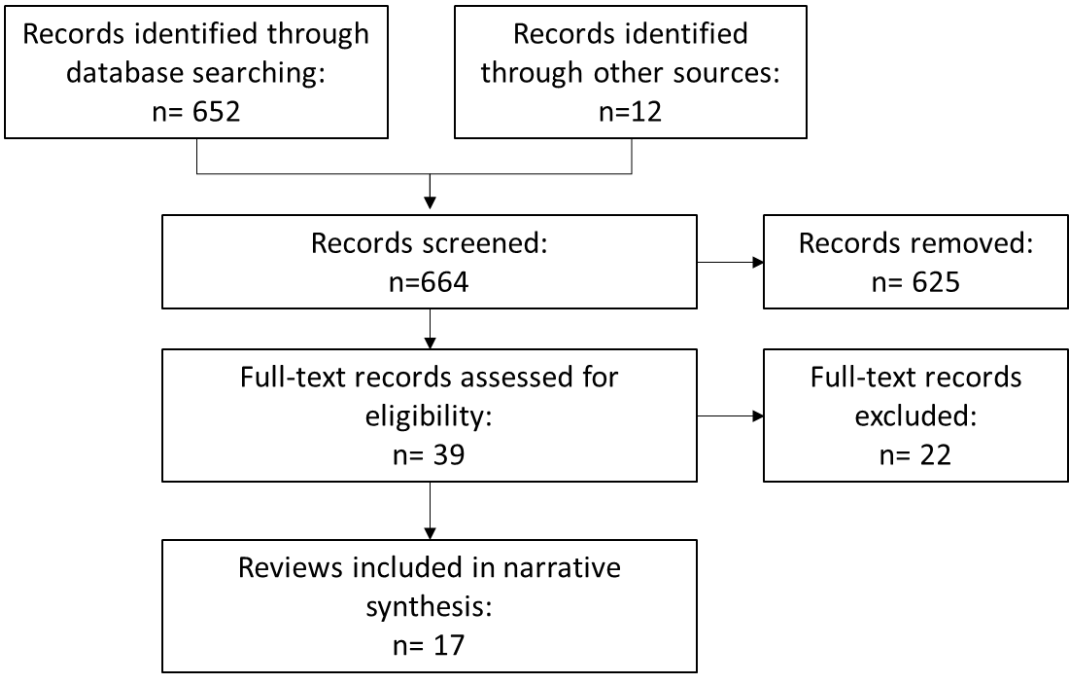

Table 3. Evidence underpinning interventions in six RD food pledges

Pledge	Authors & year	Review method level*	Direction of effect on behaviour**	Direction of effect on awareness **	Quality score (AMSTAR[a])
Pledge F1 out-of-home calorie labelling	Kiszko et al 2014	1	↓↓	↓	6
	Stran et al 2013	2	↑↑	↑↑	2
	Mozaffarian et al 2012	1	↓↓	n/a	11
	Swartz et al 2011	1	↓↓	n/a	11
	Seymour et al 2004	2	↑		6
	Holdsworth & Haslam 1998	2	↔	n/a	1
Pledge F2 Salt reduction	Mozaffarian et al 2012	1	↑↑	↑	11
Pledge F4 reduced portion sizes	Small et al (2013)	1	↑	↑	9
	Skov et al (2013)	1	↑	n/a	10
Pledge F6 Fruit and vegetables	Escaron et al (2013)	1	↑	n/a	8
	Mozaffarian et al 2012	1	↑	↑	11
	Knai et al 2006	1	↑	↑	10
	Glanz & Yaroch 2004	2	↑	↑	0
Pledge F7 Front-of-pack labelling	Hawley et al (2013)	2	↔	↑	5
	Hersey et al (2013)	1	↔	↑	9
	Mozaffarian et al 2012	1	↔	n/a	11
	Campos et al 2011	1	↑	↑	8
	Grunert and Wills 2007	1	↔	↑	8
	Cowburn and Stockley	1	↓	↓	7
Pledge F8 Saturated fats	Mozaffarian et al 2012	1	↑↑	↑↑	11
	Goodman & Anise 2006	2	↑	n/a	4
	Seymour et al 2004	2	↑↑	n/a	6
	Ammerman et al 2002	2	↑↑	n/a	9

* **Review levels**: First level= systematic reviews; Second level= reviews without the above criteria, reporting "suggestive evidence".

** **Legend for direction of effect**: ↑↑= effective; ↑= probably effective; ↔= No/weak/inconclusive evidence; ↓= probably ineffective; ↓↓= ineffective

[a] A Measurement Tool to Assess Systematic Reviews (Shea et al., 2009)

Figure 2. Overall proportion of interventions and whether they were likely motivated by the RD, across the food pledges F1,2,4,6,7,8

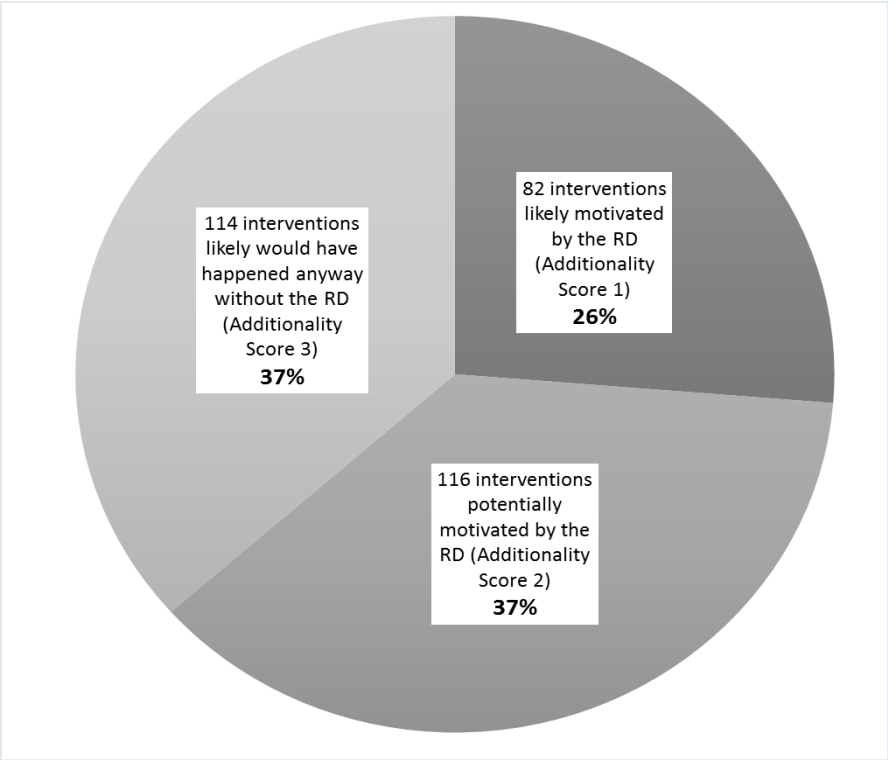

Table 4. Reported progress on implementing out-of-home calorie labelling (F1) for the organisations providing data for 2012-2014.

Proportion of standardised food and drink product lines (%)		**Proportion of outlets (%)**	
2012	**2014**	**2012**	**2014**
78	81	100	100
100	100	66	100
90	100	99.7	99.7
95	100	100	17
85	100	100	100
7	46	18	45

Table 5. Data submitted by signatories to the salt reduction pledge (coded as 1 or 2) on number and proportion of salt target categories

how many of the 80 salt target categories fall within your product / menu range (number of categories)		**Of those categories that are applicable to your business, please indicate the number and / or proportion of categories where you are meeting the 2012 targets (number and proportion of categories)**				**For those categories where you are not currently meeting the target please provide an indication of the number and / or proportion of categories where you are on track to achieve the target by the end of 2012 (number and proportion of categories)**			
2012	**2014**	**2012**		**2014**		**2012**		**2014**	
N	**N**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
	70			30	43				
13		10	77						
11	18		8		44	5	45	0	0
	25			4		25	50		
40	28	23	55	17	61	7			
40	38	23	55	21	55	7			
77	77	0		19		77			
	8	3		6	75	1			
	67			41	61			20	77
	16			12	75				
14	55	4	29	20	37	4	29		15
1	5	1	100	4	80				
	58			41	71				
	14			6	43				
	1			1	100				
	58			29	50				
5	6	3	60	3	50	1	100	5	50
72	73	72	100	73	95				
	3			3	100				
40	29	23	55	16	60	7			
3	3	2	66	2	66	1	10	1	33
8	5	0	0	2	40	2	25		
67	66		82	59	89		10		
47	52	19	40		83	24	86		
5		0	0			5	100		