The performance and potential of the Australasian Health Star Rating system: a four-year review using the RE-AIM framework

Alexandra Jones,1,2 Anne Marie Thow,3 Cliona Ni Mhurchu,1,4 Gary Sacks,5 Bruce Neal1,6

Unhealthy diets – high in salt, harmful saturated and trans fats, added sugar and energy – are a leading cause of death and disability globally.1 Australia has some of the highest obesity rates in the world: nearly two-thirds of Australian adults and one in four children are overweight or obese. Unprecedented availability and aggressive marketing of processed and pre-packaged foods and beverages are a key driver of obesity and diet-related conditions including high blood pressure, heart disease, type 2 diabetes and dental caries.2 Obesity is estimated to cost Australia more than $8.6 billion annually.3

Interpretive front-of-pack nutrition labels (FoPL) are recommended by the World Health Organization (WHO) as an evidence-based policy to promote healthier diets.4,5 These types of labels use nutrient profiling to assess the nutritional quality of individual foods and display this in a simplified, visual form. There is growing evidence that FoPL have potential to improve nutrition literacy, guide consumer choice and incentivise industry to improve their product formulations.6,7 While not a complete source of dietary advice, FoPL is recognised by WHO as a helpful tool to use in conjunction with interventions aimed at improving the overall nutritional quality of diets.8 At least 16 government-endorsed schemes in various formats are operating in over 23 countries.9 This proliferation of formats has prompted the international food standards agency, the Codex Alimentarius Commission, to commence work developing further international guidance on FoPL.10 In June 2014, Australia and New Zealand adopted a voluntary FoPL in the form of the Health Star Rating system (HSR) following a lengthy process of development involving federal, state and territory governments in collaboration with industry, public health and consumer groups.11 In short, HSR aims to “provide convenient, relevant and readily understood nutrition information and/or guidance on food packs to assist consumers to make informed food purchases and healthier eating choices”.12 Its developers also recognised that the system should aim to be aligned with existing health strategies and guidelines, and provide incentives for

Abstract

Objective: The Health Star Rating (HSR) is a front-of-pack nutrition labelling system, implemented voluntarily in Australia and New Zealand since 2014. Our aim was to evaluate HSR’s performance.

Method: We used data from peer-reviewed publications and government-commissioned monitoring and evaluation, websites and communiqués to evaluate HSR’s performance between June 2014 and October 2018 using the RE-AIM (Reach, Efficacy, Adoption, Implementation and Maintenance) framework.

Results: Thirty-three peer-reviewed publications, 21 government and three independent reports informed the assessment. Awareness and trust in HSR was increasing, though campaign reach remained low. Consumers liked, could understand and use the HSR logo, though effects on purchasing were largely unknown. The algorithm was the focus of a formal review. HSR was present on 20-28% of products but biased to those that scored better (HSR≥3.0). Necessary stakeholders were mostly engaged.

Conclusions: A substantial body of work supports continuation and strengthening of HSR. Reasonable refinements to HSR’s star graphic and algorithm, action to initiate mandatory implementation, and strengthened HSR governance present the clearest opportunities for improving public health impact.

Implications for public health: Development and implementation of government-led front-of-pack nutrition labelling systems have the potential to improve public health, while engaging a diverse set of stakeholders.

Key words: food labelling, nutrition, food policy, health star rating, obesity

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improvements to the healthiness of the food supply.13

The HSR System has three components: an underlying algorithm, the label graphic and an accompanying education campaign. The algorithm assigns a rating from 0.5 (least healthy) to 5.0 stars (most healthy) in ten half-star increments, assessing both ‘risk’ components (total energy, total sugars, saturated fat, sodium) and ‘positive’ components of food (fibre, fruit, vegetable, nut and legume content (FVNL) and in some cases, protein). It derives from an existing model used to regulate health and nutrient content claims in both countries, embedded in the Australia New Zealand Food Standards Code.14 It was adapted for HSR in consultation with Food Standards Australia New Zealand (FSANZ) and technical and nutrition experts, including industry representatives.15,16

Where they elect to utilise the system, food manufacturers are responsible for correct and accurate use of government guidance material specifying how to display one of several permitted variants of the HSR graphic.17 No fee or charge is payable to any party for HSR use, with manufacturers bearing the cost of updating their own packages. Roll-out has been accompanied by government-funded education campaigns specific to each country.

At its adoption, Australian and New Zealand Food Ministers agreed HSR would remain voluntary for five years, and subject to a two-year review of progress.18 They later agreed the system would be subject to a comprehensive formal review, due to be delivered by mid-2019.19

The aim of this study was to evaluate the extent to which the HSR had achieved its objectives since implementation and to contribute recommendations on how its public health impact may be enhanced. This evaluation was independent and separate from the formal review commissioned by government.

Table 1: Operationalising the RE-AIM Framework for evaluation of the HSR system.

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Description</th>
<th>Definition in context</th>
<th>Metrics for assessment</th>
<th>Data sources identified through search (n)*</th>
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</thead>
<tbody>
<tr>
<td>Reach</td>
<td>Proportion, and representativeness of the target population that participates in the policy</td>
<td>Extent to which the Australian and New Zealand population has access to HSR</td>
<td>Fraction of population that:</td>
<td>Government-commissioned nationally representative surveys on awareness, understanding and use (12)</td>
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<tr>
<td></td>
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<td>• Is aware of the HSR system (unprompted and prompted)</td>
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<td>• Trust HSR</td>
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<td>• Has been exposed to the HSR campaign</td>
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<td>Efficacy</td>
<td>Extent to which the policy has delivered outcomes in the target population</td>
<td>Extent to which HSR is guiding consumers towards healthier choices</td>
<td>Efficacy of HSR label graphic</td>
<td>Independent, peer-reviewed research: RCTs, randomized online surveys, choice experiments, focus groups, cross-sectional examination of food supply (28)</td>
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<td>• Consumer understanding and use</td>
<td>Government-commissioned nationally representative surveys (11)</td>
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<td>• Impact on choice and purchasing</td>
<td>Government-commissioned reports on alignment with other policies and reformulation (2)</td>
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<td>• Impact in driving industry reformulation</td>
<td>Government-commissioned campaign evaluations (10)</td>
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<td>Efficacy of HSR algorithm</td>
<td>Independent report benchmarking HSR against international best practice (2)</td>
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<td>• Alignment with current nutrition, medical and behavioural sciences literature (content validity)</td>
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<td>• Alignment with other health and nutrition policies (construct validity)</td>
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<td>• Alignment with health outcomes (predictive validity)</td>
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<td>Efficacy of HSR campaign</td>
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<td>• Consumer understanding</td>
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<td>• Impact on call to action</td>
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<tr>
<td>Adoption</td>
<td>The degree to which the necessary settings have been engaged in the policy</td>
<td>Degree to which HSR is operating as an Australian and New Zealand governments initiative in partnership with industry, public health and consumer groups</td>
<td>Representation of each stakeholder in governance structures for HSR implementation</td>
<td>Government websites: HSR, Food Regulation, AusTender, Department of Health (Aus), Ministry of Primary Industries (NZ)</td>
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<td>Stakeholder analysis of involvement, interest, power and impact of HSR on each actor</td>
<td>Government-commissioned media analysis (1) Website and reports of the Independent Reviewer</td>
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<tr>
<td>Implementation</td>
<td>Extent to which the policy actually has been implemented as intended in the real world</td>
<td>Extent to which HSR has actually been implemented as intended including the number of products displaying HSR and compliance of labels with HSR guidance materials</td>
<td>Uptake of HSR on product labels</td>
<td>Independent, peer-reviewed research, cross-sectional examination of food supply (5)</td>
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<td>• Number of products displaying, proportion of food supply</td>
<td>Government-commissioned monitoring and evaluation reports (6)</td>
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<td>• HSR status of those displaying</td>
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<td>• Number of manufacturers displaying HSR</td>
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<td></td>
<td></td>
<td>Compliance of labels displayed with HSR Guidance materials</td>
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<td>Maintenance</td>
<td>How the policy is sustained over time and is evaluated</td>
<td>Initiatives, implemented as a direct consequence of HSR, designed to enforce and sustain the intervention and monitor its effects</td>
<td>HSR governance</td>
<td>Government websites: HSR, Food Regulation, AusTender Department of Health (Aus), Ministry of Primary Industries (NZ)</td>
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<td></td>
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<td></td>
<td>• Dedicated funding sources</td>
<td>Government-issued communiqués and budget papers</td>
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<td>• Monitoring and evaluation mechanisms</td>
<td>Reports of the independent reviewer (2)</td>
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<td>• Enforcement mechanisms, including anomaly and dispute processes and other mechanisms to ensure compliance, transparency and accountability</td>
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</table>

Notes:

• Data sources may cover more than one outcome or RE-AIM dimension e.g. reports which consolidate data on general HSR awareness, and operation of the HSR campaign

Methods

We evaluated HSR with the RE-AIM framework, a method widely used to assess the public health impact of health promotion programs.20,21 The five dimensions of the framework (Reach, Efficacy, Adoption, Implementation and Maintenance) are particularly appropriate for evaluating the implementation of population health policy, allowing assessment of both the process and outcomes. In Table 1 we define metrics for evaluating each of the RE-AIM dimensions as they apply to implementation of HSR.

Data sources and criteria for inclusion

We conducted the evaluation using two sources of information:

• Government-issued information on HSR implementation (e.g. official websites, communiqués, monitoring reports and commissioned research)
A four-year review using the RE-AIM framework

- Secondary data from peer-reviewed and grey literature (e.g. reports produced by industry, consumer or public health stakeholders).

All materials were publicly available and obtained using a systematic search strategy outlined in Supplementary Appendix 1.

We limited our search to materials produced after HSR’s adoption and, given our focus on implementation, excluded any materials published about HSR’s development before and after this date. We also excluded materials concerning use of HSR in other jurisdictions and settings (e.g. on labels in other countries, or on foods or products for which it wasn’t intended). We focused on original analysis, and therefore excluded commentaries and editorials that repeated information already included through original research. To keep the exercise manageable, we excluded individual media items, but included summary media analysis released by government. We included materials published up to and including 1 October 2018.

Extraction and coding of data

We created a database of materials on HSR implementation. For each item, we extracted standard information including: author(s), title, date and place of publication, type of publication (e.g. peer-reviewed research, government-commissioned report) and jurisdiction covered (Australia and/or New Zealand). We also extracted information on study design, population and/or data relied upon to assist in evaluating the strength of the evidence obtained. Finally, we coded materials by component of the HSR System reviewed (algorithm, label and/or education campaign), outcome evaluated (awareness, understanding, use, uptake, alignment with existing policies), and relevant RE-AIM dimension. This database is included in Supplementary Appendix 1.

Analysis

Outcomes of the literature review were summarised by each RE-AIM dimension and synthesised where possible in tables and figures to provide an overall view of the degree to which each dimension has been achieved. To evaluate Adoption, we also adapted a stakeholder analysis approach used by Brugha and Varvasovszky,22 using findings of the literature review and consultation among the authors to assign a rating to the average interest, influence and position of key HSR stakeholders, and impact of HSR implementation on them. Our findings for all dimensions combined were used to assess HSR’s overall achievement of its objectives, and to make recommendations on where its public health impact could be improved.

Results

We identified 33 relevant peer-reviewed publications, 21 government-commissioned and three independent reports, most of which contained quantitative data relevant to one or more of the RE-AIM dimensions of Reach, Efficacy and Implementation: see Supplementary Appendix 1. Adoption and Maintenance were primarily assessed through information provided by the Australian and New Zealand governments through websites and communiqués, facilitating analysis of stakeholder engagement in HSR’s current operation, governance and funding.

Reach

Reach was assessed by the proportion of the population that were aware of HSR, trust it, and had been exposed to the education campaign.

HSR awareness had been evaluated in nine nationally representative surveys in Australia and three in New Zealand.23-31 They suggested low, but consistently improving, unprompted awareness (3% April 2015, to 21% July 2018), and steadily increasing prompted awareness of the HSR system (33% April 2015 to 84% July 2018) (Figure 1). Females, younger people, those with higher education, higher income and normal weight were consistently more likely to be aware of HSR.

In Australia, these surveys showed that trust in HSR among the total population had steadily increased from 38% in April 2015 to 61% in July 2018 (Figure 1). In New Zealand, trust was 39% in January 2017,33 and steady at 40% in June 2018.34

Ten of these surveys evaluated exposure to the education campaign. Australia’s campaign ran over four waves between 2014 and 2017 with eight surveys conducted up until July 2018 showing campaign recognition fluctuating between 13 and 25% (Figure 1).24-31 Evaluators noted funding was ‘modest’ compared to other government and private sector campaigns.25 In New Zealand, reported recognition rose from 12% in December 2016 to 45% in June 2018 following addition of television to the marketing mix.33,34

Efficacy

Efficacy was assessed by the extent to which HSR was guiding consumers towards healthier choices. HSR’s efficacy had been the subject of more than 29 peer-reviewed research papers and 15 government-commissioned reports covering performance of one or more of the HSR’s three components: the label graphic, underlying

Figure 1: Unprompted awareness of HSR, prompted awareness of HSR, trust in HSR and exposure to the HSR campaign in Australia.

Note:

Data is provided from the date of the first availability in Australia (April 2015).
algorithm, and accompanying education campaign.

Twenty-six papers and reports had assessed the efficacy of the HSR graphic, including two randomised controlled trials (RCTs), seven randomised choice experiments, eleven nationally representative surveys, three intercept surveys, two focus group studies, and one policy analysis paper.

**HSR ‘star’ graphic**

**Understanding and use:** Most research identified the HSR graphic as easy to understand and use. The HSR star logo was found to be more likely to be understood and to influence product selection than the Nutrition Information Panel (NIP), health and nutrient content claims, and alternative FoPL designs including the Multiple Traffic Light (MTL) and industry-preferred Daily Intake Guide. Several studies confirmed these results in children. Experimental findings were consistent with government-commissioned monitoring surveys, where between two-thirds and three-quarters of consumers consistently understood and used the HSR star logo was found to be more likely to be understood and used in practice. In 2018, the intercept survey was repeated with an updated label, producing results more consistent with other findings on consumer understanding and use. No experiments had assessed use and understanding of HSR's 'energy icon only' variant of the label, which displayed only kilojoule (and not star rating) information. In government surveys, only 1% of consumers found it easy to understand and use.

**Choice and purchasing:** Consumers consistently self-reported being influenced by HSR when shopping, but studies assessing HSR's impact on choice and real world purchases were less clear. Several studies inferred a shift towards purchasing of more healthy food or beverage choices when compared to no FoPL and suggested that HSR remained a significant attribute in driving product choice even when there were co-existing health claims or other forms of nutrition information and marketing on the label. In the disparate New Zealand studies noted above, HSR was shown to be ineffective in influencing unprompted consumer choice between two breakfast cereals and consumers made similar purchases using HSR and MTL. Randomised controlled trials examining the impact of FoPL in the real world identified no effect of HSR on the healthiness of food purchases, despite participants' stated preference for the HSR label format.

**Ability to incentivise reformulation:** Several companies reported HSR was guiding reformulation activities but only two papers systematically assessed HSR's impact on reformulation across the food supply. Research in New Zealand found small but statistically significant favourable changes in mean energy density, sodium and fibre in HSR labelled products compared with their composition prior to adoption of HSR. In Australia, these methods were replicated and used to model cost-effectiveness, with researchers determining HSR a cost-effective strategy for delivering food reformulation under both voluntary and mandatory implementation scenarios.

**HSR algorithm**

Thirteen peer-reviewed publications and two government reports assessed the performance of the HSR algorithm using different validation methods. Alignment with current scientific literature (i.e. content validity): Food components included in the algorithm were largely consistent with those in government-led FoPL elsewhere. HSR's components 'to limit' were the four most common elements reported in FoPL globally: energy (used in 41% of systems), sodium (43%), saturated fat (35%) and total sugars (41%). Not all FoPL contained 'positive' components. Those used in HSR (FVNL, fibre and protein) were used in several other FoPL elsewhere, but lack of transparency in FVNL and fibre values relied upon to calculate HSR, and changes to the 'tipping point' for determining eligibility to receive points were raised by public health and consumer stakeholders as concerns in the five-year review.

Two papers focused on incorporating added or free sugars into HSR to accord with evidence-based recommendations of Australian and New Zealand food-based dietary guidelines and updated WHO Guidelines on Sugars Intake. A 2017 audit suggested added or free sugars were included in 14% of FoPL globally. Treatment of sugars was being considered in the five-year review.

Alignment with existing policies and other measures of healthiness (i.e. construct validity): We identified eight studies that assessed alignment between HSR and the Australian Dietary Guidelines (ADGs). This work consistently found that healthy ‘core’ or ‘Five Food Group’ (FFG) foods received higher HSRs on average than ‘discretionary’ foods (HSR 1.9-2.5).

The two papers focused on added sugars demonstrated that alignment with the ADGs could be improved by incorporating added sugars into the HSR algorithm.

Three papers and one government report attempted to specify overall alignment with the ADGs. Two large cross-sectional examinations of the food supply calculating HSRs for all products (n=34,000; 65,600) regardless of whether they displayed HSR, found between 82-87% of products had HSRs corresponding with a pre-defined ‘appropriate’ range for core or discretionary foods using a cut-point of HSR 3.5 (i.e. core foods scored equal or above this and discretionary foods below this). Two smaller studies (n=1,269; 3,940) reviewed the algorithm using information from labels on which HSR was displayed. The findings of these studies highlighted that between 39-57% of discretionary foods displayed a HSR≥2.5, assessed by the study authors as an unacceptable ‘pass’ mark.

Each of these works highlighted HSR ‘outliers’, attributed in some cases to the algorithm and in others to imprecise definitions of unhealthy food. Recommendations made for improving the algorithm including its treatment of sugar, protein, juices, and unpackaged fruits and vegetables being considered in HSR's five-year review.

HSR alignment with Australia and New Zealand's existing health claims legislation was found to be good at a cut-point of HSR≥3.5; with 97.3% of products over this threshold eligible to display a health claim.

While HSR was explicitly designed to focus on packaged and processed foods, there is increasing international interest in the impact of industrial food processing on health, particularly the association between high levels of consumption of ultra-processed foods (UPF) and poor diets. Three papers assessed HSR against the NOVA food classification system. In a sample of dairy foods, HSR correctly classified milks, but not yoghurt and cheeses, based on degree
of processing. In a sample of supermarket own-brand foods voluntarily displaying HSR (n=3,940), unprocessed and minimally processed foods had a higher mean (HSR 4.4) than processed (HSR 3.5) or UF (HSR 2.5), however, 55% of UF displayed a HSR=2.5, assessed by the authors as a failure to fall below a designated cut-off of HSR 2.0. A summary of submissions to the five-year review acknowledged stakeholder comments on degree of processing, but at the time of writing the independent reviewer had determined it was outside the reasonable scope of the review.

Alignment with health outcomes (i.e. predictive validity): No papers were identified that assessed the ability of the HSR algorithm to predict health outcomes, reported as the strongest method for assessing the validity of nutrient profile models.

HSR Campaign

Eight government-commissioned surveys in Australia and two in New Zealand evaluated the performance of the HSR campaign. The majority of respondents reported that they understood campaign messages, though Australian evaluation noted some persistent confusion. In both countries, those who had seen the campaign self-reported higher awareness, trust, understanding and use of the HSR, and consistently reported carrying out at least one behavioural objective of the campaign with around two-thirds self-reporting they had purchased a new product because of its HSR.

Adoption

Adoption was measured as the degree to which the necessary stakeholders engaged in HSR implementation. Available data were used to map HSR governance structures (Figure 2) and summarise involvement of each stakeholder (Table 2). Stakeholder analysis was conducted through iterative consultation among the authors, assessing the average level of interest, influence and position of each stakeholder in HSR implementation, and HSR implementation’s resulting impact on them (Table 2).

Key stakeholders with high interest and a supportive position included the Australian (Commonwealth, State and Territory) and New Zealand governments, each of whom contributed funding and together retained ultimate decision-making power on the future of the system through voting rights exercised in the Ministerial Forum on Food Regulation (Forum). Decisions by politicians in the Forum are supported by the work of senior government officials in the Food Regulation Standing Committee (FRSC).

In New South Wales, State Government integrated HSR into its food procurement criteria in schools and hospitals. Despite this formal influence, media analysis up to 2016 noted government representatives rarely participated in public commentary on HSR implementation.

Food manufacturers and retailers have high interest and influence, though their interest and influence, though their involvement in the issue Interest in HSR Influence/Power Position Position Impact of HSR on stakeholder

Table 2: Assessment of average interest, influence and position of stakeholders involved in HSR implementation, and impact of HSR on them.

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>Characteristics</th>
<th>Involvement in the issue</th>
<th>Interest in HSR</th>
<th>Influence/Power</th>
<th>Position</th>
<th>Impact of HSR on stakeholder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australian Commonwealth Government</td>
<td>Participate in Trans-Tasman Food Regulatory Committees with remit over HSR</td>
<td>High</td>
<td>High</td>
<td>Supportive</td>
<td>Medium</td>
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<td></td>
<td>Host FoPL Secretariat – primary public point of contact</td>
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<td></td>
<td>Facilitate government coordination – e.g. chair Jurisdictional Group and TAG</td>
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<td></td>
<td>Run Australian education and awareness campaign</td>
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<td></td>
<td>Administer tender for HSR monitoring and evaluation in Australia and overall</td>
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<td></td>
<td>Contribute funding to support implementation</td>
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<tr>
<td>New Zealand Government</td>
<td>Participate in Trans-Tasman Food Regulatory Committees with remit over HSR</td>
<td>High</td>
<td>Medium</td>
<td>Supportive</td>
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<td></td>
<td>Contribute funding to support implementation, including NZ specific campaign</td>
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<td>Coordinate and manage NZ HSRAG</td>
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<td></td>
<td>Coordinate and collate NZ monitoring and evaluation</td>
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<tr>
<td>Australian State and Territory Governments</td>
<td>Participate in Trans-Tasman Food Regulatory Committees with remit over HSR</td>
<td>Medium</td>
<td>Medium</td>
<td>Supportive</td>
<td>Low</td>
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<td>Selected representatives on HSRAC and TAG</td>
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<td></td>
<td>Contribute funding to support implementation, including campaign</td>
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<td>Consider integration of HSR into State-based policies e.g. school canteen guidelines</td>
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<tr>
<td>Food manufacturers and retailers</td>
<td>Formal representation on HSRAC, TAG and NZ HSRAG</td>
<td>High</td>
<td>High</td>
<td>Somewhat supportive</td>
<td>High</td>
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<td>Responsibility to voluntarily apply HSR on products</td>
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<td>Provide in-store placement of HSR campaign materials (retailers)</td>
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<td>Public health community</td>
<td>Formal representation on HSRAC, TAG and NZ HSRAG</td>
<td>Medium</td>
<td>Medium</td>
<td>Somewhat supportive</td>
<td>Medium</td>
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<td></td>
<td>Conduct and publish research on HSR efficacy and implementation</td>
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<td>Build awareness of HSR among peers, patients and public in Australia and globally</td>
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<td>Advocate for improvements to HSR to improve public health impact</td>
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<tr>
<td>Consumer groups</td>
<td>Formal representation on HSRAC and NZ HSRAG</td>
<td>Medium</td>
<td>Medium</td>
<td>Somewhat supportive</td>
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<td>Conduct and publish consumer research on HSR efficacy and implementation</td>
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<td>Build awareness of HSR with consumers and consumer organisations globally</td>
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<td>Advocate for improvements to HSR to improve consumer utility</td>
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Notes:

Key to abbreviations used:

HSR, Health Star Rating; FoPL, Front-of-Pack Label; NZ, New Zealand; TAG, Technical Advisory Group; NZ HSRAG, New Zealand Health Star Rating Advisory Group; HSRAC, Health Star Rating Advisory Committee

*Possible values for position include: supportive, somewhat supportive, somewhat opposed and opposed

**While the majority of papers, policy statements, submissions and media representations from this group were generally supportive, a small number of vocal opponents were noted
Figure 2: Health Star Rating system governance.

**Australia and New Zealand Ministerial Forum on Food Regulation (Forum)**

**Membership:**
- Federal, state and territory Ministers responsible for food from Australia and New Zealand
- Chaired by Australian Government Minister for Rural Health

**Responsibilities:**
- Develop domestic food regulatory policy and policy guidelines for setting domestic food standards
- Ultimate authority to make HSR decisions where no HSRAC consensus; ultimate authority to decide whether HSR made mandatory
- Decision by consensus where possible, otherwise by vote with six votes required for a decision

**Food Regulation Standing Committee (FRSC) – A Forum subcommittee**

**Membership:**
- Senior officials of departments for which Ministers represented on the Forum have portfolio responsibility

**Responsibilities:**
- Coordinate policy advice to Forum, ensure nationally consistent approach to implementation and enforcement of food standards
- Absorb work of previous multi-stakeholder FoPL Steering Committee that developed HSR

**Trans-Tasman HSR Advisory Committee (HSRAC)**

**Membership:**
- Nine Australian representatives: government (3), industry and retailers (3), public health and consumer groups (3); one New Zealand representative: chair of NZ HSRAG

**Responsibilities:**
- Oversee voluntary implementation, including social marketing and monitoring and evaluation
- Assess potential anomalies identified within the HSR algorithm
- Provide advice to FRSC on implementation
- Foster ongoing collaboration between stakeholders
- Decision making by consensus, otherwise referral to FRSC and Forum

**New Zealand Ministry of Primary Industries (MPI)**

**Membership:**
- New Zealand Ministry of Primary Industries employees (unknown number)

**Responsibilities:**
- Administer and monitor HSR implementation in NZ

**Front-of-Pack Labelling Secretariat (Secretariat)**

**Membership:**
- Commonwealth Department of Health employees

**Responsibilities:**
- Public contact point for HSR
- Maintain HSR website and newsletter
- Refer matters for interpretation to HSRAC
- Facilitate jurisdictional coordination
- Administer tender for monitoring and evaluation

**New Zealand HSR Advisory Group (NZ HSRAG)**

**Membership:**
- Government (2), industry (3) public health (3), consumer groups (1), independent food consultant (1)

**Responsibilities:**
- Support voluntary implementation in NZ

**Jurisdictional Group**

**Membership:**
- Representatives from state and territory governments
- Led by FoPL Secretariat

**Responsibilities:**
- Facilitate information sharing between jurisdictions
- Brief members on issues being considered by HSRAC

**Technical Advisory Group (TAG)**

**Membership:**
- Government (4), industry (2), public health (2)
- Chaired by Commonwealth Department of Health

**Responsibilities:**
- Analyse and review performance of HSR calculator and algorithm as directed by HSRAC, using data provided by industry
- Provide evidence to support consideration of options for the five year review (no recommendations)

**Independent Reviewer (MP Consulting)**

**Membership:**
- Policy evaluation experts

**Responsibilities:**
- Conduct multi-stakeholder consultations
- Review modelling by TAG
- Produce formal five year review report considered by HSRAC, FRSC, Forum

**Commissioned monitoring providers**

- Report to relevant advisory committees by agreed timelines and frameworks
- Heart Foundation (use, understanding and uptake, AUS)
- Pollinate (campaign evaluation, AUS)
- Colmar Brunton (campaign evaluation, NZ)
- National Institute of Health Innovation, (uptake, NZ)
- Isentia (Media analysis, AUS)

**Key:**
- Government: Political appointees
- Government: Public sector employees
- Multi-stakeholder body
- Commissioned service provider
- Reporting line as specified in box text

**Note:** The Two Year Report prepared by HSRAC refers to additional committees: a multi-stakeholder ‘Social Marketing and Advisory Group’ (SMAG) providing feedback and guidance on the education campaign; and a Monitoring and Evaluation Reference Network (MERN) providing opportunity discussion between government jurisdictions and monitoring organisations. As no further information is publicly available on these groups, they have not been included in this diagram.
participation on HSR governance committees was limited to those below the governmental Forum and FRSC. In HSR’s voluntary form, their power comes primarily from agreeing to apply HSR to product labels. Given the potential business impact of mandatory labelling requirements, peak industry bodies had indicated their support for HSR, conditional on it remaining voluntary. Media analysis found industry the most frequently cited stakeholder conveying favourable messages about HSR, including that it helps promote products, drives innovation and that industry were acting to introduce it. Health and consumer groups participated in HSR governance committees. On the trans-Tasman Health Star Rating Advisory Committee (HSRAC) they had combined numbers equal to industry. They influenced and supported implementation by conducting independent research and disseminating information to their own networks, interest groups and the wider public. Common messages conveyed by these groups in media analysis were that HSR could be an effective tool to communicate with consumers, but also that it was being used by industry in ways that favoured their own interests. In formal consultations and policy statements, health and consumer groups broadly indicated their support for HSR while advocating for it to be strengthened, made mandatory and complemented with other nutrition policies.

**Implementation**

Implementation was measured by the extent to which HSR was appearing on labels as intended, assessed by both commissioned monitoring and independent publications involving cross-sectional examination of the food supply.

**Uptake**

Uptake had been examined in five peer-reviewed publications and six government-commissioned reports covering both Australia and New Zealand. Results indicated uptake was increasing, with government issuing a communiqué in June 2018 that HSR had been displayed on 10,333 products in Australia and over 3,900 in New Zealand. Studies that examined proportionate uptake suggested HSR was on between 20-28% of eligible products in the Australian food supply in 2017, 2018. Only ten per cent of new products entering the Australian market between June 2014 and June 2017 chose to display HSR. In Australia, more than 118 manufacturers were using HSR in 2018, but large retailers Coles, Woolworths and Aldi were together responsible for more than half of all uptake. Uptake was skewed towards products that scored at the upper end of the five-star spectrum. More than 50% of uptake was on UPF foods. Maintenance

**Maintenance**

Maintenance was assessed by measures taken by stakeholders to sustain HSR over time. Data available directly from government websites detailed HSR governance structures, complaints mechanisms, frameworks for monitoring and evaluation, and funding committed.

**Governance structures**

Figure 2 illustrates the governance of HSR in its voluntary status as at October 2018. The trans-Tasman government bodies of the Forum and FRSC retained ultimate decision-making power on the operation and continuance of HSR. Underneath this, implementation was overseen by the HSRAC, whose remit was to foster ongoing collaboration between government, industry, public health and consumer groups. HSRAC coordinated the HSR education campaign, as well as monitoring and evaluation of the system, reporting outcomes to the Forum and FRSC. HSRAC also received matters submitted through HSR complaint mechanisms for decision making by consensus. Where consensus could not be reached, matters were refered to the Forum and FRSC. Ancillary support was provided by the FoPL Secretariat (Secretariat) in the Australian Commonwealth Department of Health. The Secretariat acted as public contact point, maintaining the website and newsletter. They also led a Jurisdictional Group, facilitating information sharing on HSR between Australia’s states and territories. In New Zealand, HSR implementation was administered by the Ministry of Primary Industries (MPI), who received advice from their own multi-stakeholder Health Star Rating Advisory Group (HSRAG). Legal analysis suggested the Australian Commonwealth Government possessed the requisite authority to make HSR mandatory if desired.

**Compliance**

Government-commissioned monitoring suggested at least 90% of HSR labels complied with Style Guide formatting requirements, with errors predominantly of a minor technical nature or related to poor legibility. Official monitoring also suggested >90% accuracy of HSR values, with incorrect calculations more frequently under-reporting, rather than over-stating HSR, usually by 0.5 stars. Independent research raised issues concerning inconsistent use of the ‘energy icon only’ variant of HSR, particularly on low-scoring non-dairy beverages.

**Complaint mechanisms**

Potential algorithm anomalies can be submitted to HSRAC for consideration; by October 2018 there had been 21 submissions, two of which (tinned vegetables and dairy desserts) were determined to meet the specific definition of ‘anomaly’, warranting follow up action. An additional dispute resolution procedure exists for challenging HSRs on individual products, though to date no disputes appear to have been registered. Outside these processes, HSRAC has dealt with concerns surrounding HSR implementation in an ad hoc manner. For example, ‘the form of the food – as prepared’ is used as a specific definition of ‘anomaly’, warranting follow up action. An additional dispute resolution procedure exists for challenging HSRs on individual products, though to date no disputes appear to have been registered.

**Monitoring and evaluation framework**

Conduct of monitoring in Australia was tendered to the National Heart Foundation shortly after implementation. It included regular reports on consumer awareness and use, as well as label implementation, accuracy, and nutrient status of products carrying HSR. Similar activities occurred in New Zealand, coordinated by MPI with input from academic research organisations. Regular monitoring of uptake and use was supplemented with commissioned evaluation of the education campaign and HSR coverage in media.

In 2016, HSRAC issued a combined two-year monitoring report compiling data from this work. Following this, planning commenced for a formal five-year review. An independent reviewer (MP Consulting) was appointed by the...
tender, and a voluntary multi-stakeholder Technical Advisory Group (TAG) created with specific remit to analyse performance of the HSR algorithm and provide technical input. The review involved several rounds of written and face-to-face consultation. Feedback consolidated and reported online noted the main concerns raised, namely that some products high in sugar, fat and salt could carry a high rating. Results of TAG modelling attempted to provide solutions and were published online with a calculator to test the implications of preferred options on products. Recommendations on long-term maintenance of HSR, including whether the system should be made mandatory were to be provided in a report for consideration first by HSRAC and then FRSC to inform a decision by Forum Ministers on the future of HSR in mid-2019.

**Funding commitments**

Comprehensive information on HSR funding was difficult to obtain due to its federated, trans-Tasman structure. Budget documents recorded $5.3 million committed by Australia’s Commonwealth government to HSR for the period 2016-2019, noting continued involvement and endorsement of government was critical to HSR’s continued involvement and endorsement of government. Tender databases suggested it distributed about $2.2 million on monitoring and evaluation services, and about $2.3 million up to October 2018 on campaign development and evaluation. This did not include costs of media buy: in 2017, phase four of the campaign alone had a media buy of $2.2 million. Specific contributions or spending by state and territory governments or by New Zealand for HSR related activities were not publicly available and were not included in this sum. It is not clear what resources would be made available for sustaining HSR after delivery of the review report in 2019.

**Conclusions**

More than four years since voluntary implementation commenced, a significant body of evidence supports continuation and strengthening of HSR. Our systematic analysis points to key areas where HSR’s public health impact can be enhanced (see Box 1).

Awareness and trust were reported as increasing, though unprompted awareness remained modest given HSR’s position as a key pillar of both countries’ responses to addressing the huge burden of diet-related disease. Lower awareness among Australians who were overweight, live in rural areas or experience socioeconomic disadvantage suggests opportunity to improve HSR’s utility among these groups. Successful targeted efforts in New Zealand with ‘priority’ groups suggest similar attention in Australia would be important to address ongoing health inequities.

Exposure to the HSR campaign remained disappointing. While evaluators suggested campaign funding was ‘modest’, it made up a significant proportion of total spend on HSR. Monitoring suggested most people were aware of HSR from ‘seeing it on pack’, making it arguably more cost-effective for government to focus on increasing HSR uptake, rather than further spending on awareness campaigns.

The bulk of peer-reviewed and government-commissioned research focused on HSR’s efficacy. The ‘star’ graphic was shown to be well-liked by consumers, and superior in utility to the industry-preferred DIG. To maximise the utility of a single FoPL, the DIG and its variants (i.e. Treatwise, energy icon variant of HSR) should now be formally retired. Innovation in FoPL formats worldwide suggest opportunities for strengthening HSR’s graphic design further. Evidence-based features to enhance visibility and consumer utility such as incorporation of colour (for example, France’s Nutriscore or the MTL), written government endorsement (as in Chile and Singapore) and Canada’s proposed rules for positioning FoPL in a uniform pack position away from health claims provide inspiration for future research and updates to the HSR Style Guide (Box 1).

HSR’s efficacy also depends on its underlying algorithm providing an accurate representation of the healthiness of food. Substantial attention has been placed on the performance of the HSR algorithm, predominantly through content and construct validity assessments that show its similarities with other nutrient profiling algorithms and tend to support its performance as a reasonable, albeit imperfect, tool to assess nutritional quality. Differences in methodologies and ‘cut-points’ have led to variations in results that highlight challenges in assessing alignment with other measures of healthiness without pre-defined indicators by which to measure ‘success’, e.g. a HSR threshold or band of scores appropriate to delineate ‘healthy’ from ‘unhealthy’ or minimally processed from ultra-processed foods. Despite these differences, broadly consistent recommendations have emerged for strengthening algorithm alignment with existing health policies (Box 1).

Our assessment also highlighted that the HSR algorithm has not been subject to more robust forms of validation. HSR is not unique in this respect: a recent systematic review found only 10% of nutrient profile models being used in government-led nutrition

### Box 1: Recommendations for improving HSR’s public health impact.

**Reasonable refinements to improve efficacy**

- Strengthen utility of the ‘star’ graphic by considering standardised colour, size and placement, specifying separation from health claims, ending concurrent use of non-interpretable labels (e.g. Daily Intake Guide, Treatwise, ‘energy icon only’ variant)
- Implement HSR algorithm improvements to reflect findings of existing research: incorporate added sugars, strengthen treatment of sodium, review treatment of protein, consider treatment of fresh fruit and vegetables including unpackaged
- Conduct further high level validation studies to explore link between the HSR of foods, healthier diets, and health outcomes

**Responsive regulatory action to improve uptake**

- Clear targets with specified timelines (e.g. 80% eligible products within two years of 2019 review completion) and commitment by Forum to make mandatory on specified date where sufficient progress not demonstrated
- Improve transparency and accountability of uptake monitoring through use of regularly updated, publicly available branded food composition database

**Strengthen government leadership to improve HSR governance**

- Renewed and unambiguous public commitment and funding to continue HSR beyond five year review
- Increased public visibility of government leadership at ministerial level
- Authority and resource delegated to FSANZ to provide independent technical advice
- Renewed Terms of Reference for multi-stakeholder involvement, controlling for conflicts of interest, particularly in technical functions such as algorithm review and determining anomalies
- Improve transparency of multi-stakeholder committees and public consultations, e.g. agendas and minutes, individual submissions publicly available
- Reform complaint mechanisms to improve utility, provide expeditious resolution of reasonable concerns raised by all stakeholders, including consumers
- Integrate HSR into other government-led nutrition policies e.g. procurement for public settings, criteria for marketing to children, fast food menu labelling
- Situate and support HSR within a comprehensive policy framework e.g. National Obesity or Nutrition Strategy
Low uptake by industry (particularly on less healthy products), despite their public endorsement of HSR supports review of the Terms of Reference for their engagement. This should take into account increasing global awareness of the need to prevent and manage conflicts of interest in the development of national nutrition policies. 108 Notably absent from governance arrangements outlined in Figure 2 are Food Standards Australia New Zealand (FSANZ) who have the expertise and independence to conduct many of the functions performed voluntarily by HSRAC and the TAG to date.

While a renewed HSRAC may have a role in continuing to promote multi-stakeholder collaboration in implementation, delegation of greater technical authority to FSANZ to administer and validate the algorithm, monitor uptake, and assess compliance using publicly available branded food composition data, could mitigate real or perceived commercial conflicts of interest in HSR’s governance and facilitate its progressive integration into the formal food regulatory system.

Linkages between HSR and other health policies, as done by NSW in procurement standards, or by countries like Chile in linking FoPL with restrictions on marketing to children,109 provide opportunities to further the utility of HSR. Strategically situating and supporting HSR within a comprehensive policy framework such as a National Obesity Strategy will enhance synergies with existing and future interventions to address diet-related disease.

This paper used a systematic approach to synthesising a growing body of heterogeneous material on HSR’s implementation and efficacy. The strength of the evidence obtained is importantly limited in several areas by study design, the scope of the analyses done and the magnitude of the projects completed. Further investment in high-quality research will provide better insight into the most likely effects of HSR on health outcomes, and how best to maximise them through both technical enhancements and improvements in implementation.

Analysis of industry compliance with the HSR algorithm was limited by lack of transparency surrounding some food components (e.g. benefits obtained from Fruit, Vegetable Nut and Legume (FVNL) content) as companies are not required to display the relevant data on the label. Our governance assessment was to some degree limited by reliance on public information, e.g. no available minutes of HSRAC or TAG meetings.

Implications for public health

Adoption of HSR in 2014 placed Australia and New Zealand among a small but growing number of countries using FoPL as one tool to promote healthier diets. Four years since implementation commenced, available evidence supports the continuation and strengthening of HSR.

As the formal five-year review draws to a close in 2019, reasonable refinements to HSR’s star graphic and algorithm, action to initiate mandatory implementation and strengthened governance – particularly through renewed, visible government leadership – present the clearest opportunities to enhance HSR’s public health impact.

References


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