Short Communication

Identifying implementation gaps and priorities for the Singapore government to improve food environment policies: perspectives from a local expert panel

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Abstract

Objective: Singapore, an urbanised, developed nation, with a high reliance on food importation and a high prevalence of eating out is facing rising rates of obesity and diabetes. The objective of the current study was to characterise and evaluate the Singapore government's policies to improve the food environment and to identify and prioritise concrete actions.
Design: The Healthy Food Environment Policy Index tool and process were used. An expert panel rated the Singapore government's implementation of forty-seven indicators compared with international best practice in 2018. Indicators were prioritised, and specific recommendations were proposed by panel.
Setting: Singapore.
Participants: Twenty experts primarily from academia.
Results: As compared with international benchmarks, the level of implementation of most indicators (thirty-three indicators, 70 %) by the Singapore government was evaluated as being at least moderate. Highly rated indicators included those related to provision of healthier meals at school, supporting the use of healthier ingredients by food vendors and governmental leadership. More policy indicators (6, 26 %) as compared with infrastructure support indicators (2, 8 %) received a 'very little or no implementation' rating. After rating, the experts prioritised eleven indicators and proposed thirty-one actions informed by several considerations including those of effectiveness, political acceptability, feasibility and unique characteristics of food retail in Singapore.
Conclusions: Supported by documented evidence, an independent expert panel identified areas of strengths and provided specific recommendations to meaningfully improve the Singapore food environment to facilitate healthier eating. Fundamental recommendations including improving nutrition profiling and strengthening monitoring systems have the potential to positively influence environments across policy domains.

Unhealthy dietary behaviours can be attributed in part to obesogenic food environments[1] both at the household[2] and at the community level[1]. One of the key architects of the food environment is the government. By its laws, policies and health promotion efforts, government actions can influence the availability (trade, food composition and food provision policies), accessibility (retail policies, labelling policies), affordability (fiscal policies) and promotion

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(marketing, labelling and educational actions) of foods[3] which are key determinants of food choice. Indeed, several governments have recently introduced stronger regulatory measures such as taxation of sugar-sweetened beverages[4] and front-of-pack labelling[5] to improve environmental determinants of dietary behaviour. Characterising, monitoring and evaluating government actions are imperative for the continued development and improvement of policies that proactively engineer our environments to support healthy eating[6]. Ongoing assessment of government policies may also increase accountability and serve as a measure of progress[7].

In Singapore, having poor dietary choices is the leading behavioural risk factor for premature death and ill health, primarily from chronic diseases such as CVD and diabetes[8]. In 2017, 36·2 % of Singaporean adults were overweight, 8·7 % were obese and 8·6 % had diabetes[9]. By 2050, the prevalence of diabetes is projected to reach 15·0 %[10]. Recognising the urgent need to more comprehensively address this rise, the Singapore government announced a War on Diabetes in 2016, with improving dietary behaviours as a key strategic focus[11,12]. This includes creating supportive environments by providing healthier foods in schools and limiting food marketing. Singapore is an urbanised[13], high-income country, with a large reliance on food importation[14], a high prevalence of eating out primarily at small independent eateries[15] and a history of taking robust measures to address public health issues[16]. Comprehensively mapping and evaluating the food environment policy landscape in Singapore are critical to identify areas of strength and policy gaps that need to be addressed.

Current efforts to evaluate the implementation of food environment policies are largely driven by international organisations such as the WHO and are typically limited in scope[17]. More recently, several countries have used the Healthy Food Environment Policy Index (Food-EPI) to assess national-level government policies. This tool which is rated as high quality[18] evaluates government actions as compared with best practices[3,19]. In the current study, we used the Food-EPI process and tool to evaluate Singapore government actions to create healthier food environments and to prioritise areas for future action.

Methods

We largely followed the Food-EPI methodology that has been previously described[20]. Briefly, during a 1-d workshop in March 2018, an expert panel rated Singapore government actions according to international best-practice benchmarks across forty-seven good practice indicators of the Food-EPI. These indicators map to thirteen domains, namely seven food policy domains (composition, labelling, promotion, provision, price, retail and trade) and six infrastructure support (leadership, governance, funding,

monitoring and intelligence, platforms for interaction and health-in-all policies) domains. Details of the methods are publically available[21]; relevant extracts of the process are provided in online Supplementary Document 1.

Evidence compilation and verification
The evidence document for Singapore was iteratively compiled with input from the government including from the Ministry of Health, Health Promotion Board, Agri-Food and Veterinary Authority, Ministry of Social and Family Development and Ministry of Trade and Industry. Singapore's government actions for the forty-seven indicators from July 2016 onwards were obtained by reviewing government documents and Singapore newspapers, and through personal communications with government officials. We sent this information to relevant ministries for clarification and verification, and pertinent inputs were incorporated. The finalised document was shared with the experts 2 weeks prior to the workshop.

Expert panel recruitment
In January 2018, expert panel members were recruited using purposive and snowballing methods. The panel comprised of twenty public health and nutrition experts from academia, non-governmental organisations and medical/professional associations (45·5 % response rate), with a larger proportion of women (75 %) and academics (65 %). The panel had broad representation of expertise across food policy domains with the exception of food trade. Experts were identified through purposive and snowball sampling methods by reviewing relevant peer-reviewed journal articles, local newspaper opinion pieces, name lists of national taskforces involved in developing obesity prevention policies and by recommendations. Food industry or government experts were excluded to limit potential conflicts of interest. Experts were contacted via email and those who agreed to participate were provided with a 1-h orientation session to facilitate familiarity with the Food-EPI process, the evidence document and the rating process.

Full day workshop: rating and proposing actions
There were two parts to the workshop, and the entire process was deliberative. At the workshop, for each indicator a summary of Singapore's policy actions was first presented by two study team members. Government officials – who were present at the workshop as observers – responded to questions from the panel and provided updates on Singapore's policy actions. Each expert then anonymously rated Singapore's government action against international benchmarks for that specific indicator using a Likert scale from 1 to 10 (1 being 'very little, if any' implementation and 10 being 'high' implementation as compared with the benchmarks). Singapore's policy was the best practice benchmark for two indicators: for subsidies that favour

healthy food, and programmes to support the availability of healthier foods at retail food outlets. Rating was done using an audience response tool (TurningPoint ResponseCard RFLCD) which allowed live sharing of the distribution of the ratings, mean and median ratings, once all experts had rated the indicator. After rating all forty-seven indicators, participants were asked to prioritise up to ten of the forty-seven indicators anonymously based on importance and achievability for further discussion of concrete actions to be implemented by the Singapore government. The top eleven indicators were selected. The discussion was facilitated by two study team members. This session was audio-recorded and transcribed. Recommended actions were extracted from the transcripts by two researchers independently. This list was compiled and sent to the experts via email to verify for accuracy and completeness.

Data analyses

Median rating for each indicator was categorised into four implementation levels: 'very little, if any' ($\leq 2\cdot5$), 'low' ($2\cdot6$–$5\cdot0$), 'moderate' ($5\cdot1$–$7\cdot5$) and 'high' ($\geq 7\cdot6$). Inter-rater reliability was calculated with the Agreestat programme using the Gwet's AC2 coefficient[22]. Recommended actions were classified using the Nuffield's Ladder of intervention[23]. This framework describes the spectrum of government policies to improve population health in view of their impact on an individual's autonomy. Actions at higher rungs of the ladder are typically viewed as being more intrusive, therefore needing greater justification for implementation. As infringements on personal autonomy are often used as an argument against policy implementation[24], and as perceived impact on personal freedom is an important determinant of policy acceptance[25], this framework has been used to understand public sector policies in several public health fields despite its limitations[24]. As an exploratory analysis, one of the authors who is trained in qualitative methods (Z.T.) coded the workshop transcript inductively for themes[26,27] to explore the main considerations of the expert panel for proposing actions during the discussion. The coder had no prior personal relationship with panel members or government officials but had attended modules of two panel members. The workshop transcript was first read broadly to identify key considerations, a coding framework was developed and this was subsequently applied to the entire transcript. The main themes are listed in online supplementary material, Supplemental Table 1 with examples of quotes.

Results

Overall, a large proportion of the indicators was assessed as 'moderate' ($46\cdot8\%$) or 'high' ($23\cdot4\%$) implementation when compared with international benchmarks (Table 1). More than a third of the infrastructure indicators received a 'high' or 'at the level of best practice' rating ($33\cdot3\%$) whereas only two indicators ($8\cdot3\%$) received a 'very little or none' implementation rating. In contrast, over a quarter ($26\cdot1\%$) of the food policy indicators received 'a very little or none' rating. The Gwet's AC2 inter-rater reliability coefficient was $0\cdot71$ (95% CI $0\cdot64$, $0\cdot78$), indicating good agreement between experts on the ratings.

Among the food policy indicators, food subsidies to favour healthy foods received the highest median rating score of $9\cdot0$ (Fig. 1), with Singapore being the only example available as the international benchmark. Other food policy indicators assessed as 'high' level of implementation included policies in schools and public sector settings to promote healthy food choices. Among the infrastructure support indicators, restricting commercial influence on policy development obtained the highest median rating score of $8\cdot5$. Several indicators in the leadership domain including the presence of strong, visible, political support, food-based dietary guidelines and a comprehensive implementation plan linked to national needs received high ratings.

Indicators that were assessed as 'very little, if any' and 'low' level of implementation (median rating score $\leq 5\cdot0$) were largely in the food policy area and included indicators in 'food promotion' domain, and in the 'price' domain including 'reducing taxes on healthy foods', 'increasing taxes on unhealthy foods' and 'ensuring that food-related income support is for healthy foods'. Infrastructure support indicators that received low ratings included 'access to government information', 'using systems-based approach to prevent obesity' and 'assessing the impacts of food and non-food policies'.

Most indicators (nine out of eleven, 82%) prioritised for further discussion were food policy indicators, and most

Table 1 Distribution of rating scores for forty-seven indicators across four levels of policy implementation in Singapore

Median rating score	Level of implementation	Food policy indicators (n 23)		Infrastructure support indicators (n 24)		Total (n 47)	
		n	%	n	%	n	%
$\leq 2\cdot5$	Very little, if any	6	26·1	2	8·3	8	17·0
2·6–5·0	Low	4	17·4	2	8·3	6	12·8
5·1–7·5	Moderate	10	43·5	12	50·0	22	46·8
$\geq 7\cdot6$	High	3	13·0	8	33·3	11	23·4

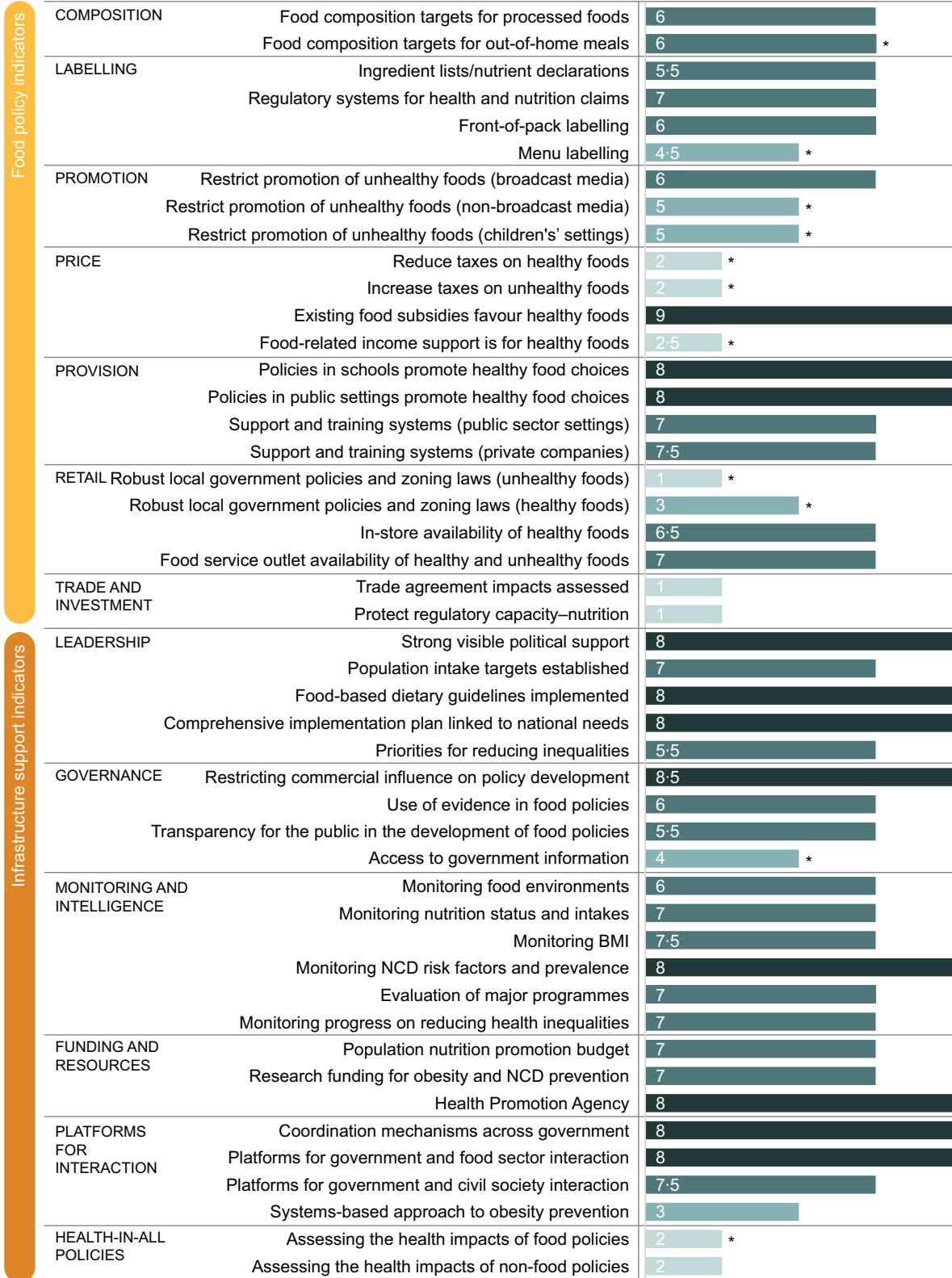| Domain	Category	Indicator	Median score
Food policy indicators	COMPOSITION	Food composition targets for processed foods	6
		Food composition targets for out-of-home meals	6 *
	LABELLING	Ingredient lists/nutrient declarations	5·5
		Regulatory systems for health and nutrition claims	7
		Front-of-pack labelling	6
		Menu labelling	4·5 *
	PROMOTION	Restrict promotion of unhealthy foods (broadcast media)	6
		Restrict promotion of unhealthy foods (non-broadcast media)	5 *
		Restrict promotion of unhealthy foods (children's' settings)	5 *
	PRICE	Reduce taxes on healthy foods	2 *
		Increase taxes on unhealthy foods	2 *
		Existing food subsidies favour healthy foods	9
		Food-related income support is for healthy foods	2·5 *
	PROVISION	Policies in schools promote healthy food choices	8
		Policies in public settings promote healthy food choices	8
		Support and training systems (public sector settings)	7
		Support and training systems (private companies)	7·5
	RETAIL	Robust local government policies and zoning laws (unhealthy foods)	1 *
		Robust local government policies and zoning laws (healthy foods)	3 *
		In-store availability of healthy foods	6·5
		Food service outlet availability of healthy and unhealthy foods	7
	TRADE AND INVESTMENT	Trade agreement impacts assessed	1
		Protect regulatory capacity–nutrition	1
Infrastructure support indicators	LEADERSHIP	Strong visible political support	8
		Population intake targets established	7
		Food-based dietary guidelines implemented	8
		Comprehensive implementation plan linked to national needs	8
		Priorities for reducing inequalities	5·5
	GOVERNANCE	Restricting commercial influence on policy development	8·5
		Use of evidence in food policies	6
		Transparency for the public in the development of food policies	5·5
		Access to government information	4 *
	MONITORING AND INTELLIGENCE	Monitoring food environments	6
		Monitoring nutrition status and intakes	7
		Monitoring BMI	7·5
		Monitoring NCD risk factors and prevalence	8
		Evaluation of major programmes	7
		Monitoring progress on reducing health inequalities	7
	FUNDING AND RESOURCES	Population nutrition promotion budget	7
		Research funding for obesity and NCD prevention	7
		Health Promotion Agency	8
	PLATFORMS FOR INTERACTION	Coordination mechanisms across government	8
		Platforms for government and food sector interaction	8
		Platforms for government and civil society interaction	7·5
		Systems-based approach to obesity prevention	3
	HEALTH-IN-ALL POLICIES	Assessing the health impacts of food policies	2 *
		Assessing the health impacts of non-food policies	2

Fig. 1 (colour online) Ratings of indicators for the food policy and infrastructure domains for Singapore by level of implementation based on median rating scores (very little, if any: 1–2·5; low: 2·6–5·0; moderate: 5·1–7·5; high: 7·6–10). The number inside the bar is the median rating score of the indicator. Indicators with a * were prioritised for further discussion. ▪, very little, if any; ▪, low; ▪, moderate; ▪, high. NCD, non-communicable disease

Table 2 List of thirty-one proposed actions for the Singapore government classified by its impact on autonomy using the Nuffield's Ladder of intervention

	Recommended actions
Eliminate choice	–
Restrict choice	Restrict use of less healthy ingredients • Use of healthier ingredients in food preparation as a regulatory requirement in educational institutions • Ensure food rations for vulnerable populations meet minimum criteria for healthfulness Restrict promotions and advertising • Extend the timing in the TV programming schedule under the children's code • Regulate use of product placements in TV shows • Extend the outdoor advertising regulations beyond 50-m radius • Limitations on the discounts/promotions that quick service restaurants situated in educational institutions can offer
Guide choice through disincentives	–
Guide choice through incentives	Promotion related • Regulate promotion of meals or products with toys/games/incentives such that they meet certain nutritional guidelines Cost related • Introduce tiered pricing mechanism where healthier commodities are subsidised or not taxed • Provide food vouchers for low-income groups to subsidise purchase of healthier foods • Offer rental subsidies and/or other benefits (e.g., prime locations) to stalls that sell healthier foods
Guide choice through changing the default policy	Changes to current labelling policy • Labelling system to highlight foods with high amounts of nutrients of concern • Nutrition labelling system that considers minimum standards of nutrients of concern consistently across all packaged food categories
Enable choice	Availability of healthier ingredients • Introduce initiatives to facilitate setting up of farmer's markets • Offer support to encourage urban farming Availability of healthier foods • Regulate overall healthfulness of the food service mix in retail space • Regulate type of foods that can be sold in vending machines in educational settings • Offer variety of comfortable settings for caregivers of young children and youth to hang-out in
Provide information	Establishing standards to guide policy making and public education • Establish minimum standards for nutrients of concern across all food categories • Include guidance related to Na, added sugar and portion size for 'My Healthy Plate' • Mandatory menu labelling for energy and nutrients of concern for certain types of food establishments For public health nutrition community • Increase accessibility to government data • Basis for policy decision should be publically available (e.g., scientific evidence and the rationale for developing and implementing a policy) • Policy effectiveness (including cost-effectiveness) should be made available • Create platforms for data-sharing
Monitor	Compliance with current codes • Monitor compliance with the children's advertising code using more systematic and robust processes Monitoring systems to guide policy making • Establish monitoring systems to evaluate the utilisation of food rations among lower income groups • Commission natural experiments to observe the impact of policies implemented on population behaviour and related health impact Research studies to guide evidence-based policy making • Commission studies to characterise the nature and the extent of some of the newer methods of advertising to children • Commission studies to assess the impact of fiscal measures on consumer behaviour and potential health outcomes • Commission studies to characterise the relationship between price and willingness to purchase foods • Funding should be made available for rapid assessment of policies implemented

(ten out of eleven, 91 %) received a median rating of ≤5·0. A total of twenty-five food policy actions and six infrastructure support actions were recommended by the expert panel. Actions were largely aimed at enabling or guiding food choice (Table 2) and none involved eliminating choice (e.g., banning certain foods) or using disincentives (e.g., taxation). More intrusive actions that reduce autonomy through restriction such as advertising limits were recommended for vulnerable populations such as children. Monitoring actions were typically recommended for policies that were self-regulated such as the code for regulating advertising of foods to children or where existing evidence seemed inadequate, such as characterising the price elasticities of foods to develop fiscal policies.

Considerations around political acceptability, opposition from industries, lack of conclusive evidence on effectiveness, operational difficulties, nature of the food retail environment in Singapore and complementary or bridging character of actions were brought up when discussing recommendations (see online supplementary material, Supplemental Table 1).

Discussion

Our findings suggest that while experts in public health nutrition in Singapore largely have a favourable view of the infrastructure support, several policy action areas remain to be more fully developed. Higher ratings for the infrastructure support domain, as compared with policy domain, have been observed in other countries[19]. Global advocacy for governments to assume leadership in establishing an infrastructure to monitor and address chronic diseases and risk factors such as obesity is fairly recent[28]. It is possible that with time, good infrastructure support may translate into robust policy actions. However, considering the urgency of the global obesity crisis, there is a need to better understand and strengthen facilitators that can catalyse this process.

Given its stable and uncorrupt governance[13] and successes in implementing strong tobacco regulatory measures[16], Singapore may seem to be well-positioned to take a leadership role in implementing robust food environment policy measures. Indeed, the presence of strong visible leadership and a health promotion agency with dedicated funding were seen as strengths by the panel. Nevertheless, existing pressures such as high reliance of the Singapore economy on trade[13] and food importation[29], its business-friendly reputation[13,30] and scarce land resources[13] may pose challenges in formulating policies for specific areas such as nutritional labelling, zoning or trade.

In line with previous studies[19], our panel recommended more rigorous policy actions such as restricting unhealthy food choices for vulnerable population groups such as children. Taxation of unhealthy foods, a regulatory measure which is increasingly adopted by other countries[4], was not considered suitable for short-term implementation. This may be partly related to the perceived lack of contextualised information on price sensitivity of foods and responses to fiscal policies. Instead, the need to more clearly develop cut-offs for classifying healthfulness of packaged and cooked foods which can be used across policies or programmes was emphasised for more immediate implementation. Other policy approaches that were highlighted included better monitoring of existing policies such as the children's advertising code which is self-regulated[31] and strengthening of policies such as front-of-pack labelling which comprises of a voluntary endorsement scheme[32].

Key policy areas prioritised by the Singapore panel such as setting compositional cut-offs for nutrients of concern and improving labelling policies were also emphasised by expert panels in Malaysia[33] and Thailand[34]. This highlights potential opportunities for synergies and possibly the need for supra-national governance to improve the regional food environment, particularly as Singapore imports over 90 % of food products, with Malaysia and Thailand being important trading partners[14].

Highly rated policy indicators, namely subsidies for healthy foods and programmes for healthier foods in schools and government settings, were all related to government actions to improve the availability of healthier foods at out-of-home settings. Over 75 % of Singaporean adults eat a meal prepared out-of-home on a daily basis[15], mostly at small independent eateries[15], which makes conventionally proposed measures such as mandatory nutritional menu-labelling challenging. Instead voluntary approaches are used to support the use of healthier ingredients by food vendors[35], and healthier food programmes are vigorously promoted for adoption in settings such as government facilities and public schools[36] which fall under government purview. In particular, the healthier ingredient development scheme, which provides funding support to oil manufacturers to promote the use of lower-saturated oil blends to food vendors at a price that is comparable to less healthier counterparts, received the highest rating amongst all indicators. Singapore's actions to improve the out-of-home retail food environment add to the evidence base of policies which countries facing similar challenges could consider.

The Food-EPI methodology has several strengths, including rating across a comprehensive set of indicators and the employment of an engagement process between local experts and government that facilitates transparency and dialogue. While we broadly followed the Food-EPI process, we made contextual adaptations for Singapore. Specifically, we provided an in-person orientation to each expert to familiarise them with the structure of the evidence document and the workshop. We also used a voting system to prioritise key indicators to allow for more time for further discussion.

Recommendations from local experts are more likely to be anchored in an understanding of the geo-political realities and socio-cultural values of Singaporeans. While the evidence used to rate Singapore was limited by what was publically available and by what government officials were willing to share, we mitigated this by inviting government officials to the workshop as observers to provide updates. It is possible that the presence of government officials may have influenced ratings, but this was likely limited as ratings were kept anonymous. The responses of our panel may not fully reflect those of all local experts, as our response rate though similar to those observed in other countries[19] was modest,

and there was limited representation of non-academics in the panel. The thematic analysis of the discussion was exploratory in nature and may not provide a comprehensive view of the factors considered by the expert panel as they propose future actions.

This work represents the first effort to comprehensively characterise and evaluate the food environment policy space in Singapore and provides guidance to government officials and public health advocates in their efforts to improve the food environment in Singapore and other similar urban Asian environments. Our results provide unique insights into the challenges and opportunities presented in designing healthier food environments and add to ongoing global efforts to characterise and evaluate government actions to support healthier eating. Important structural recommendations such as the need for profiling the healthfulness of foods and strengthening monitoring systems have the potential for improving the robustness of policy actions across domains.

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Supplementary material

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