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From the President

13 November 2023

Ms Clare Anderson
Standing Committee on Health, Aged Care and Sport
Department of the House of Representatives
PO Box 6021
Canberra ACT 2600

Via email: health.reps@aph.gov.au

Dear Ms Anderson

RE: RACP follow-up information brief for the inquiry

The Royal Australasian College of Physicians (RACP) thanks the Standing Committee on Health, Aged Care and Sport for the opportunity to attend the witness hearing for the Inquiry on Diabetes on 15 September 2023 at Parliament House.

The RACP appreciates this opportunity to inform national policy on diabetes and improve health outcomes for patients living with diabetes and obesity. To this effect, I understand that during the hearing, the Standing Committee sought supplementary evidence from the RACP on:

- Integrated models of care for obesity and diabetes
- The impact of regulations on children's exposure to junk food and sugar drinks advertising
- The efficacy of sugar taxes
- The efficacy of pharmacotherapies for obesity.

I am pleased to enclose an information brief with further references and evidence covering the above themes. The brief contains the most cited and evidence-based sources, based on advice from Professor Louise Baur AM FRACP, who represented the RACP in the witness hearing.

Should you require any further information about this matter, please contact the RACP Policy & Advocacy Team by email: policy@racp.edu.au

Yours sincerely

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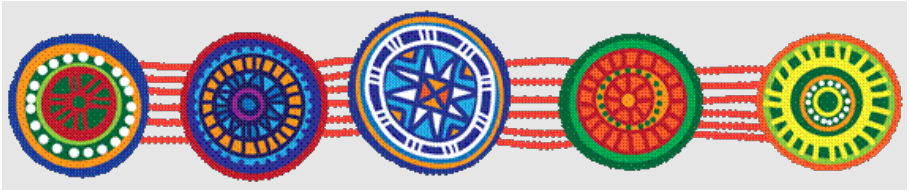
The Royal Australasian College of Physicians

FOLLOW-UP INFORMATION TO THE INQUIRY ON DIABETES

Parliamentary Standing Committee on Health, Aged Care and Sport

October 2023

We acknowledge and pay respect to the Traditional Custodians and Elders – past, present and emerging – of the lands and waters on which RACP members and staff live, learn and work. The RACP acknowledges Māori as tangata whenua and Te Tiriti o Waitangi partners in Aotearoa New Zealand.



Note on contents

As requested during the 15 September testimony by Professor Louise Baur AM representing the Royal Australasian College of Physicians (the RACP) to the Standing Committee on Health, Aged Care and Sport on the Committee's Inquiry on diabetes, the RACP is sharing additional information by way of an annotated bibliography on the following healthcare issues.

- The RACP's support of MBS primary care management items for obesity, including the need for dedicated items numbering more than five sessions for obesity-related presentations.
- Alternative models of integrated care and practitioner remuneration to reduce avoidable hospital admissions in obesity and type 2 diabetes.
- The effects of the obesogenic environment and the RACP Switch Off the Junk Campaign seeking national regulation of junk food and sugary drinks marketing to children.
- Post-implementation outcomes of sugar taxes in other jurisdictions.
- The efficacy of pharmacotherapies for obesity incorporating adult- and adolescent-specific clinical trials.

Provided in addition to linked RACP policy documents, the items included in the bibliography meet a rigorous standard, are methodologically robust and have replicable findings. The RACP believes that these key findings provide further evidence for our recommendations delivered to the Inquiry on diabetes.

This information is supplementary to the RACP's submission to the Inquiry on diabetes previously provided to the Committee. The summary of key findings is followed by a section that covers additional information and citations.

Thank you for the opportunity to represent the views and expertise of our members. The RACP invites further engagement on any points contained in the initial submission or this document.

Summary of findings

- *Primary care management of obesity*

Evidence-based management of obesity in Australian primary care settings is hampered by MBS item restrictions which reduce available care time, limit capacity for sensitive conversations with patients and preclude sustained multidisciplinary intervention in primary care and community settings.

Medicare's Chronic Disease Management items are not used to their full capacity for obesity. As currently used, they do not allow for appropriate assessment of obesity and related comorbidities as well as of suitable secondary prevention strategies. In addition, patients can only access five allied health visits per year. Improving MBS primary care obesity management at an earlier point is expected to reduce high-cost specialist and hospital services at a later point in the patient journey.

The RACP supports expanding MBS primary care items for obesity assessment and management, noting that a minimum of 12 consultations have been recommended in related systemic reviews of randomised controlled trials for obesity management in primary care (Madigan et al 2022; Tronieri et al 2019).

- *Alternative models of practitioner remuneration for integrated community-based obesity and type 2 diabetes care*

Fee-for-service models of care have a crucial role in our health system in the management of acute and short-term conditions; they are also increasingly identified as not fit for purpose for long-term management of chronic and complex conditions such as diabetes and obesity. Improved integration across primary health care and the broader healthcare system and the need for innovative funding models have been identified by governments and experts alike as the key to delivering better health outcomes to patients and ensuring the healthcare system remains sustainable into the future.

The RACP model of chronic care management lays out the design for an alternative model of health care funding and practitioner remuneration that could operate alongside fee-for-service within our healthcare system for type 2 diabetes or obesity. Blended funding in the form of a pooled package for individual patients meeting specific criteria

at risk of hospitalisation is at the centre of the model. The aim is to reduce avoidable hospitalisations, point of care delays, repeat referral and improve responsive, patient-centric care by joining up specialists within Local Hospital Networks with primary practices within Primary Healthcare Networks. The pooled budget would pay for the services of a core physician and GP, with purchasing options for allied health. To trial and establish the model, a modest share of Activity Based Funding, Chronic Disease Management funding or a combination could be used.

Funding approaches that promote joined up work between physicians and GPs in Australia have improved outcomes in type 2 diabetes care. Significantly reduced patient hospitalisation rates, improved GP skill in diabetes management, freed up capacity within the health system and more efficient use of hospital resources are some of the recorded outcomes of specialist to primary care integration (Productivity Commission 2021). For First Nations communities, this integration has been shown to improve clinical risk indicators for diabetes and treatment continuity (Hotu et al 2018). The barriers remain system fragmentation and the lack of dedicated funding sources.

- *The effects of the obesogenic environment and the RACP Switch Off the Junk Campaign*

Environments strongly influence food preference and combine with biology to contribute to overweight and obesity. The national and international evidence the RACP identified shows a link that is clear for children: the ubiquitous advertising of junk food and sugary drinks on media including television, the internet and social media has been shown to influence children's dietary preferences and heighten pressure on caregivers to make a junk food purchase (WHO 2023; Rozendaal & Buijzen 2023; Driessen et al 2022). The effect is more pronounced in lower income households and culturally diverse households, making the issue one of health equity (Backholer et al 2021). Evidence also shows increased short-term consumption without later decompensation in children after reviewing junk food advertising (Coleman et al 2022). International best practice recommends comprehensive national regulations preventing children's exposure to this advertising in all forms of media (WHO 2023).

The RACP Switch Off the Junk Campaign calls attention to relevant national and international evidence and best practice in media regulation, noting that recent studies of Australian adults support national action and scoping reviews of existing challenges in the Australian media settings indicate an urgent need for comprehensive national regulation (Nuss et al 2023; ACMA 2022). Regulation in Chile and the UK has been successful in reducing advertising volume content and exposure levels; some evidence suggests it has had modest impacts on post implementation purchasing behaviour, consumption and household junk food expenditure (Dillman et al 2020; Chambers et al 2015; Silva et al 2015; UK Ofcom 2010).

- *Sugar taxes*

The wide supply and affordability of unhealthy products is another environmental driver which in tandem with physiology contributes to overweight and obesity. Sugary drinks are not only often more affordable than drinks without added sugars, but in recent times in Australia the rate of cost inflation for drinks without sugar in major cities has been far higher than those with added sugars (Lewis et al 2023). The overall proportion of income needed to purchase sugary drinks is declining in high-and-low-income countries (Rao et al 2013; Blecher et al 2017).

Several systemic reviews and expansive quasi experiments have now demonstrated that sugar taxes are most successful at a rate between 10-20% (White et al 2023; World Bank Group 2020; Teng et al 2019; Afshin et al 2017; Wright et al 2017). The reviews identify outcomes that have included increasing the cost of sugary drinks, increasing the share of income needed to purchase them, expanding health literacy, incentivising product reformulation and expanding the tax base for government in countries and jurisdictions where sugar taxes of an adequate level for disincentive are implemented. Some studies also observe a shift toward non-sugary drinks where sugar taxes have been applied.

Australian adults have expressed high levels of in-principle support for a sugar tax, particularly if it were to be reinvested in prevention (Miller et al 2019).

- *The efficacy of pharmacotherapies for obesity in the clinical trial literature*

The evidence for pharmacotherapies in severe obesity and type 2 diabetes management is increasing, indicating a major role for public subsidies to broaden affordable access to pharmacotherapies where clinically necessary, as part of the suite of available medical interventions.

The GLB1 receptor agonist dulaglutide has been effective at lower doses (0.75mg or 1.5mg per week) for glycaemic control in children with diabetes (10-18 years) without effect on body mass index. Some gastrointestinal side effects have been observed, however the safety profile of dulaglutide for children with diabetes has been rated as consistent with that pertaining for adults with diabetes (Arslanian et al 2022).

Clinically significant weight reduction has been observed in children 12 years and over administered higher doses than for type two diabetes of the GLB1 receptor agonists liraglutide 3.0 mg daily and semaglutide 2.4mg weekly by comparison to experimental controls. Weight reduction effects significantly surpassed placebo and placebo with lifestyle interventions for controls. This finding is replicated in various international trials with controlled designs involving overtime follow-up of included participants (Lister & Baur 2023; Weghuber et al 2022; Kelly et al 2022).

Liraglutide and semaglutide have now become a recognised evidence-based component of medical interventions available in managing severe obesity or complex obesity with comorbid conditions, and life threatening obesity in the United States for children aged 12 to 18 years; the suitability of setmelanotide and combination phentermine or topiramate has also been considered in the USA within a risk benefit framework for life threatening, severe of complex obesity in children (Hampel et al 2023). The safety profile of pharmacotherapies has not yet been established for children under 12 years of age.

For adults over 18 years, a recent review of current clinical trials finds that liraglutide and semaglutide are similarly indicated for obesity at higher doses than for type two diabetes, with greater efficacy than placebo and lifestyle interventions for obesity: liraglutide 3.0 mg daily and semaglutide 2.4 mg weekly for obesity, and up to 1.8 mg daily and 1.0 mg weekly, respectively, for type 2 diabetes (Warmsley et al 2023). The predominant gastrointestinal side effects had a similar profile for the two medications, were found to be transitory and eased with a gradual tapering in this review. Tirzepatide, an agonist of both GLP1 and glucose-dependent insulinotropic polypeptide is a third pharmacotherapy that has shown significant efficacy in reducing weight in overtime trials of adults, as has Setmelanotide for hypothalamic obesity in most people with LEPR and POMC mutations (Lister & Baur 2023).

Additional information and citations

- *MBS primary care items for obesity*

Medicare's Chronic Disease Management (CDM) items are not used to their full capacity for obesity. When used, they do not allow for appropriate assessment of obesity, related comorbidities and suitable secondary prevention strategies. Inconsistent understandings of eligible conditions for CDM management and gaps in knowledge of services that can be subsidised for people with obesity are key barriers to CDM use. Patients with obesity can only access a total of five allied health visits per year in contrast to patients on an eating disorder plan or mental health plan which allow a higher number of visits. Improving MBS primary care obesity management at an earlier point is expected to reduce high-cost hospital services at a later point in the patient journey.

The RACP supports expanding CDM items for specific primary care management of obesity as per our submission to the Inquiry and the evidence below.

Madigan CD et al. Effectiveness of weight management interventions for adults delivered in primary care: systematic review and meta-analysis of randomised controlled trials. BMJ. 2022 May 30;377:e069719
This systematic review of 34 clinical trials of primary care interventions for obesity identifies that at least 12 contacts (telephone or face to face) are needed to deliver effective weight management programmes in primary care.

Tronieri JS, et al. Primary Care Interventions for Obesity: Review of the Evidence. Curr Obes Rep. 2019 Jun;8(2):128-136
This review of randomised controlled trials for primary care obesity interventions concluded that most studies demonstrated that providing 12 or more sessions per year in-person, by phone, or electronically, produced clinically meaningful weight loss (4 to 7 kg). Low-to-moderate-intensity behavioural counselling and counselling that did not include behavioural strategies (e.g., motivational interviewing) produced modest losses of 1 to 2 kg. The addition of weight loss medication increased mean losses relative to behavioural treatment alone.

- *Non-fee for service practitioner remuneration models for integrated community based responsive care*

The RACP Model of Chronic Care Management (MOCC)
The above linked model of chronic care management outlines an innovative way of renumerating GPs and specialists working in joined up community based multidisciplinary team settings for patients with complex multimorbidities and intermediate level care needs at risk of hospitalisation.

MOCC funding would be primarily based on a blended budget with a value-based component. This budget would cover the cost of employing the members of the core team as well for the core team itself to purchase other clinical services for the patient on a fee-for-service basis as needed. The clinician services provided by the core team would be funded on a non-fee for service basis and the funding would go to the organisations that supply the clinicians, whether these are private practices or public hospitals. This would take the form of an annual fixed per patient payment (i.e., an annual capitation payment) provided to each clinician (or more specifically their employing organisation). The per patient payments would be set at a level reflecting the commitment of time (both patient and non-patient facing) required over the course of the year depending on the risk level allocated to the patient. A modest share of funding drawn from Activity Based Funding, MBS payments for Chronic Disease Management items and practice nurse incentive payments would fund the MOCC.

Proposed benefits are supporting connections between physicians and the primary care sector by reducing current financial disincentives under fee-for-service and activity-based systems against investing sufficient time in the kinds of non-face-to-face and non-procedural services which are essential to the management of patients with chronic comorbidities. More acute medium to high-risk patients might also be identified, with greater potential to include them in patient-centred programs of care associated with reductions in high-cost admissions, and anxiety prompted hospital presentations.

Two additional factors that make the MOCC highly suitable for integrated complex obesity and diabetes type 2 care are its target population and governance.

1. Target population includes individuals who have multi-morbidities who are referred from either the PHN level or the LHN level and:
    - (a) are at high risk of one or more hospital presentation or admission in the next twelve months, OR
    - (b) have already had one or more unnecessary or avoidable hospital presentations or admissions in the past twelve months OR
    - (c) are receiving care in the community under GP care who may benefit from significant additional support or expertise. For such patients there may be a role for other medical practitioners in providing consulting advice to GPs (e.g., consultant physicians in particular diseases such as diabetes) or allied health professionals to contribute to more comprehensive care (e.g., dieticians, psychologists, exercise physiologist).
2) Governance structure is a Steering Committee in each Primary Health Network (and/or ACCHO where an ACCHO is present) that includes LHN representation. The Steering Committee would be tasked with administering pooled Commonwealth/State funding, fund holding, local model review and refinement, growing public health awareness of the model, and supporting communications lines and the patient flow process. A Care Management Committee would sit under each Steering Committee. Management Committees would formulate appropriate clinical algorithms to risk stratify patients, developing appropriate referral, testing and treatment pathways for patients of the different risk classes, designing appropriate multidisciplinary team arrangements for different risk classes of patients, lead and educate clinicians in this new way of working.

Productivity Commission report Innovations in Care for Chronic Health Conditions (2021).
In line with the integrated care principles underlying the RACP MOCC, several innovative integrated care arrangements linking PHN and LHN resources in the responsive care of patients with type 2 diabetes and comorbidities are documented in the above report.

Queensland Health's Darling Downs Diabetes Care Project on page 77**.** Darling Downs Hospital and Health Service (DDHHS) received funding from the Queensland Government's Integrated Care Innovation Fund to develop a new model of care for people with diabetes. The model of care was designed to provide appropriate care to people with diabetes in their own communities. The program included upskilling GPs to improve the quality of primary care for people with diabetes and reduce the need for people to attend hospital to receive care. An endocrinologist with the DDHHS provided education sessions, visited GP practices and provided ongoing support to GPs in key aspects of diabetes management. The new model of care reduced the proportion of diabetes-related emergency department presentations that resulted in admission, from 94% in 2015-16 to 68% in 2016-17 and 2017-18. People also reported that their care was more flexible, convenient and satisfying. The new model also improved access for people who previously had difficulty accessing appropriate care, including those living outside the region's main towns and Aboriginal and Torres Strait Islander people.

Western Sydney Diabetes on page 97**.** Western Sydney Diabetes uses telehealth and virtual meetings to connect people's usual GP with endocrinologists, diabetes educators and dietitians to develop a diabetes management plan. This collaboration assists with the management of diabetes in the community, freeing up specialised hospital care for people with more complex cases. Further, by involving GPs in telehealth meetings the model has built the capacity of GPs to improve their diabetes management skills that can be applied to other patients they see.

NSW Health Lumos Program on pages 134-135**.** The Lumos program links records from participating general practices in NSW to records held by NSW Health such as hospital admissions, emergency department and outpatient visits, and mortality. The program supports primary care to understand its impacts on reducing hospital readmissions. It also enables information gathering on characteristics that can help identify those people most at risk of developing certain chronic conditions to improve outcomes. For example, Lumos has shown that the risk of hospitalisation for diabetes and chronic kidney disease is halved with early recognition in primary care.

Vic Health's HealthLinks Project on page 161-166 is also of particular interest. HealthLinks focuses on people with chronic and complex health conditions who are at risk of three or more unplanned hospital admissions in a 12-month period. Patients are identified using an algorithm applied to the Department of Health's hospitals datasets. The algorithm considers factors including unplanned admissions in the past six months; emergency department visits in the past three months; age; residential status; smoking status; and selected chronic conditions including diabetes. Under the model, five participating hospitals have received funding as capitation grants, first from the Victorian Government alone, and then jointly from the Commonwealth and Vic Health. The capitation grant is calculated on the expected use of inpatient activity-based funding units, based on data from the previous five years. In 2016-17, about $40 million was converted to capitation grants (about 0.25% of the $16 billion recurrent expenditure on Victorian public hospitals). The capitation grant must be used to cover all services provided to the cohort, including hospital inpatient admissions and the alternative HealthLinks services provided. Communities of Practice, covering clinical, operational and data and analysis processes, were established to support the implementation of HealthLinks and share lessons across the participating hospitals. The Communities of Practice are supported by a secretariat in the Victorian Department of Health. It is early to determine the definitive outcomes of HealthLinks, but preliminary site results suggest it has improved patient outcomes and made more efficient hospital resource use.

Hotu C, et al. Impact of an integrated diabetes service involving specialist outreach and primary health care on risk factors for micro- and macrovascular diabetes complications in remote Indigenous communities in Australia. Aust J Rural Health. 2018 Dec;26(6):394-399
This article identifies the beneficial patient outcomes from an impromptu integrated care model trial for First Nations remote communities, revealing the benefits of innovative models of integration for health equity. The model involved rural outreach to primary practices by an endocrinologist and diabetes nurse educator at several points over a year, to see patients for collaborative care planning and upskill the primary care team. For the 124 patients

included, significant reduction was seen in median glycosylated haemoglobin from baseline to 12 months. Median total cholesterol was also reduced. The number of patients prescribed glucagon-like peptide-1 analogues and dipeptidyl peptidase-4 inhibitors increased over the 12 months and an increase in the number of patients prescribed insulin trended towards statistical significance.

- *Switch Off the Junk: national regulation of junk food and sugary drink advertising to children*

RACP Switch Off the Junk Campaign
Through the RACP's Switch Off the Junk Campaign Australia's paediatricians and physicians are calling on the Australian Government to immediately act to reduce the rampant junk food advertising and its toll on children's health. This must be done through comprehensive, evidence-based, enforceable and properly enforced national regulation of food and drink marketing that targets children.

The below citations show that the environments in which children live and the influences they are exposed to interact heavily with biology in driving overweight, obesity and type 2 diabetes. National action on environmental drivers including regulation across all the media is urgently needed. It is also broadly supported by expert and public opinion as well as by reported outcomes in jurisdictions that have acted.

World Health Organisation, Policies to protect children from the harmful impact of food marketing, July 2023, pages 13-16
This recent WHO systematic review of 96 studies (2009-) and narrative review of 129 studies (2009-) on food marketing exposure and its associations with children's food-related attitudes, beliefs and behaviours, shows that junk food advertising is likely to appeal to children and makes use of specific appealing strategies; these strategies are used more often than when marketing healthier foods. The WHO concludes that exposure to food marketing likely affects children's food choice or intended choice, product requests or intended requests, dietary intake and that failing to act risks increasing epidemiological risk.

Esther Rozendaal & Moniek Buijzen (2023) Children's vulnerability to advertising: an overview of four decades of research (1980s–2020s), International Journal of Advertising, 42:1, 78-86
This article overviews four decades of quantitative and immersive research showing convincing evidence of the vulnerability of children to media advertising of unhealth foods, its impact on perceptions, the developmental learning process and attitudes of children.

Backholer K, Gupta A, Zorbas C, Bennett R, Huse O, Chung A, Isaacs A, Golds G, Kelly B, Peeters A. Differential exposure to, and potential impact of, unhealthy advertising to children by socio-economic and ethnic groups: A systematic review of the evidence. Obes Rev. 2021 Mar;22(3):e13144.
This systematic review of 25 studies into the impact of junk food media advertising for children shows that on the balance, exposure levels and impact on dietary preferences are generally increased for ethnic children and children of lower socio-economic households; the study underlines the need for national regulation as a matter of public health equity.

Coleman et al, 'A rapid review of the evidence for children's TV and online advertisement restrictions to fight obesity', Preventive Medicine Reports 26 (2022), 101717
This rapid review of studies published in the medical literature from 2006-2020 on the links between food advertising and obesity in children and adolescents up to 18 years observes a clear link between advertising exposure and increased acute (short term) consumption of unhealthy products by children.

Driessen C, Kelly B, Sing F, Backholer K. Parents' Perceptions of Children's Exposure to Unhealthy Food Marketing: a Narrative Review of the Literature. Curr Nutr Rep. 2022 Mar;11(1):9-18
This rapid review of studies published in public health literature from 2012-2022 indicates that unhealthy food marketing leads parents to feel undermined in their ability to provide healthy foods to their children. Despite this concern, parents tend to underestimate the levels of exposure to, and impacts of, unhealthy food marketing to their children, especially in the digital ecosystem.

Nuss T, Chen YJM, Scully M, Hickey K, Martin J, Morley B. Australian adults' attitudes towards government actions to protect children from digital marketing of unhealthy food and drink products. Health Promot J Austr. 2023 Jun 7
This recent survey study of over 2000 Australian adults aged between 18-64 years recruited via two national panels reveals that 69% of the sample agreed Government should broadly protect children from unhealthy food and drink advertising.

Australian Communications and Media Authority (ACMA), What Audiences Want- Audience expectations for content safeguards (2022)
This recent community expectations review by the national media and communications regulator identifies the increasing public expectation that regulatory frameworks will curb the widespread promotion of junk food and sugary drinks advertising. See pages 24-26. These pages also identify contemporary issues needing consideration in a national regulatory scheme, as well as emergent concerns regarding the patchiness of advertiser self-regulation in a rapidly developing multimodal media context.

Policies to reduce children's exposure to junk food advertising | Obesity Evidence Hub
RACP Partner, Food for Health Alliance (FHA), formerly the Obesity Policy Coalition (OPC), has developed a database of evidence- based research from jurisdictions that have put in place media regulations to limit junk food advertising to children. These include the United Kingdom, Canada, South Korea, other highly developed countries, and industrialising and developing countries, such as Chile from which Australia could learn valuable lessons for most effective approach.

Dillman et al, 'Evaluating the impact of Chile's marketing regulation of unhealthy foods and beverages: pre-school and adolescent children's changes in exposure to food advertising on television. Public Health Nutr. 2020;23(4):747-55
This evaluation of children's exposure to junk food advertising in Chile pre and post implementation of its initial television restrictions finds that for sample of 879 mothers, 753 pre-school children and adolescents, pre-schoolers' and adolescents' exposure to high-in food advertising in total decreased significantly by an average of 44 and 58 %, respectively. Exposure to high-in food advertising with child-directed appeals, such as cartoon characters, decreased by 35 and 52 % for pre-schoolers and adolescents, respectively. Decreases were more pronounced for children who viewed more television. Products high in sugars were the most prevalent among the high-in ads seen by children after implementation.

UK Ofcom. High Fat, Salt and Sugar advertising restrictions: final review. London: Ofcom, 2010
These three post implementation evaluations of regulatory restrictions placed on junk food and sugary drinks advertisements in the United Kingdom and Chile (two academic and one by the independent UK media industry regulator) show that regulations are most suitable to reduce advertising volume for children when applied to key times children watch television or access the internet, which now overlap with adult viewing or access times.

Silva et al, 'An Evaluation of the Effect of Child-Directed Television Food Advertising Regulation in the United Kingdom'. Canadian Journal of Agricultural Economics 63 (2015) 583–600
This post implementation evaluation finds that advertising regulations for television have been associated with some modest per capita reductions in household junk food and sugary beverage expenditure in the United Kingdom.

Chambers et al. Reducing the volume, exposure and negative impacts of advertising for foods high in fat, sugar and salt to children: A systematic review of the evidence from statutory and self-regulatory actions and educational measures. Preventive Medicine, 2015; 75:32-43
This systematic review of 47 studies finds that statutory regulation could reduce the volume of children's exposure to advertising for junk foods and has potential to impact more widely over the long term with cumulative gains. It shows that self-regulatory approaches showed varied results in reducing children's exposure.

- *Comparative costs of healthy diets and junk foods and a sugar tax*

Beyond the ubiquitous marketing of food and sugary drinks, another obesogenic environmental driver is the wide availability of low-cost sugary drinks and junk food, often cheaper than more healthy alternatives. Disincentivising

policy controls are needed for junk foods and sugary drinks and incentivising initiatives for healthy diets and drinks, as indicated by the following studies.
Several systemic reviews and expansive quasi experiments have demonstrated that sugar taxes at a rate between 10-20% have resulted in outcomes that include: increasing the cost of sugary drinks, increasing the share of income needed to purchase them, expanding health literacy, incentivising product reformulation and expanding the tax base for government in countries and jurisdictions where sugar taxes of an adequate level for disincentive are implemented. Some studies also observe a shift toward non-sugary drinks where sugar taxes have been applied.

Rao M, et al. 'Do healthier foods and diet patterns cost more than less healthy options? A systematic review and meta-analysis' BMJ Open 2013;3:e004277
This systematic review of 27 studies across 10 countries in the esteemed BMJ identified that healthier diets cost on average per day between $1.48-$1.95 more than unhealthy diets. The cumulative affordability barriers of this price difference, amplified by family unit composition, would be potentially significant overtime for priority population groups.

Lewis M, et al. 'Healthy Food Prices Increased More Than the Prices of Unhealthy Options during the COVID-19 Pandemic and Concurrent Challenges to the Food System' Int J Environ Res Public Health. 2023 Feb 10;20(4):3146
This recent comparative cost study of dietary options in Greater Brisbane from 2019-2022, during the COVID pandemic finds that the cost of unhealthy foods and drinks increased on average by 9% while healthy dietary products increased by 17.2%, further maximising the cost appeal of unhealthy products especially for lower income households.

Blecher E, et al. 'Global Trends in the Affordability of Sugar-Sweetened Beverages, 1990–2016'. Prev Chronic Dis 2017;14:160406
This retrospective analysis of survey data from 40 high-income and 42 low-income and middle-income countries from 1990 to 2016 found that the proportion of income needed to purchase sugar-sweetened beverages declined on average (using annual measures) during the study period. It concludes by recommending deliberate policy action to raise prices so that sugar-sweetened beverages are less likely to become more affordable and more widely consumed.

World Bank Group. Taxes on Sugar Sweetened Beverages: International Evidence and Experiences (September 2020)
This wide-scoping review of evidence from countries and jurisdictions that have implemented various forms of a tax on sugar sweetened beverages shows that the taxes work to reduce consumption and improve population health by increasing retail prices and reducing sales and purchases of taxed beverages. These taxes also raise public awareness, sending a strong signal to the public about the health effects of consumption. Well-designed sugar-based and tiered volume based SSB taxes have also been shown to effectively incentivize product reformulation, as well as other industry responses aimed at minimizing tax burden. Revenue generated by these taxes can be considerable, although difficult to predict with precision, particularly if a tax successfully incentivizes industry actions (such as reformulation) to minimize tax burden.

Teng AM, et al. 'Impact of sugar-sweetened beverage taxes on purchases and dietary intake: Systematic review and meta-analysis'. Obes Rev. 2019 Sep;20(9):1187-1204
This expansive systematic review and metanalysis incorporating of consumer purchasing habits across countries and jurisdictions pre and post sugar tax implementation shows that the equivalent of a 10% tax was associated with an average decline in beverage purchases and dietary intake of 10.0% with considerable heterogeneity between results. The equivalent of a 10% SSB tax was also associated with a nonsignificant 1.9% increase in total untaxed beverage consumption (e.g., water). Based on real-world evaluations, taxes introduced in jurisdictions around the world appear to have been effective in reducing sugar sweetened beverage purchases and improving dietary intake.

Afshin A, et al. 'The prospective impact of food pricing on improving dietary consumption: A systematic review and meta-analysis'. PLoS One. 2017 Mar 1;12(3):e0172277

This rigorous pooled quantitative analysis of 23 interventional studies and 7 prospective cohort studies with 37 intervention arms from jurisdictions where a sugar tax has been introduced estimates that each 10% price increase reduced sugar-sweetened beverage purchases by 7%.

Wright, A. et al. 'Policy lessons from health taxes: a systematic review of empirical studies'. BMC Public Health 17, 583 (2017)
This systemic review of 91 peer-reviewed and 11 grey-literature studies incorporating evidence from countries with a higher income per capita found that high tax rates on sugar-sweetened beverages are likely to have a positive impact on health behaviours and outcomes, and, while taxes on products reduce demand, they add to fiscal revenues. The study concludes that the weight of evidence supports the implementation of taxes that increase the price of products by 20% or more.

White JS, et al (2023) Evaluation of the sugar-sweetened beverage tax in Oakland, United States, 2015–2019: A quasi-experimental and cost-effectiveness study. PLoS Med 20(4): e1004212.
This quasi experimental study evaluated the outcomes of a 14% sugar sweetened beverage tax in Oakland from 2015-2019. The main sample of sales data included 11,627 beverage products, 316 stores, and 172,985,767 product-store-month observations. The main analysis, a longitudinal quasi-experimental difference-in-differences approach, compared changes in beverage purchases at stores in Oakland versus Richmond, California (a nontaxed comparator in the same market area) before and 30 months after tax implementation (through December 31, 2019). Additional estimates used synthetic control methods with comparator stores in Los Angeles, California.

The study found that beverage purchases declined by 26.8% in Oakland after tax implementation, a finding that was sustained more than two years after tax implementation. There were no detectable changes in purchases of untaxed beverages or sweet snacks or purchases in border areas surrounding cities. A key finding is that the estimated changes in purchasing patterns when translated into declines in consumption would accrue significant societal cost savings (>$100,000 per 10,000 residents) over 10 years, with greater gains over a lifetime horizon.

Miller CL, et al. Are Australians ready for warning labels, marketing bans and sugary drink taxes? Two cross-sectional surveys measuring support for policy responses to sugar-sweetened beverages. BMJ Open. 2019 Jun 27;9(6):e027962.
This study summarises the outcomes of a nationally representative survey of 3430 Australians aged 18 and over examining levels of support for a sugar sweetened beverage tax. It found that 60% of the sample supported a stand-alone tax, but 77% supported the tax when paired with use of funds for obesity prevention. Comparisons are made with the findings of a 2014 survey, which reveals growing support for sugar beverage taxation among Australian adults overtime.

- *Efficacy of pharmacotherapies for type 2 diabetes and obesity*

The evidence for pharmacotherapies in severe obesity and type 2 diabetes management is increasing, pinpointing a major role for public subsidies to broaden affordable access to pharmacotherapies where clinically necessary, as part of the suite of available medical interventions.

Arslanian SA, et al. Once-Weekly Dulaglutide for the Treatment of Youths with Type 2 Diabetes. N Engl J Med. 2022 Aug 4;387(5):433-443
This double-blind, placebo-controlled, 26-week trial randomly assigned 158 participants (10 to <18 years of age; body-mass index [BMI], >85th percentile) being treated with lifestyle modifications alone or with metformin, with or without basal insulin in a 1:1:1 ratio to receive once-weekly subcutaneous injections of placebo, dulaglutide at a dose of 0.75 mg, or dulaglutide at a dose of 1.5 mg.
It concluded that the incidence of gastrointestinal adverse events was higher with dulaglutide therapy than with placebo but that the safety profile of dulaglutide in children was consistent with that reported in adults. Treatment with dulaglutide at a once-weekly dose of 0.75 mg or 1.5 mg was superior to placebo in improving glycaemic control through 26 weeks among youths with type 2 diabetes who were being treated with or without metformin or basal insulin, without an effect on BMI.

Walmsley R, Sumithran P. Current and emerging medications for the management of obesity in adults. Med J Aust. 2023 Apr 3;218(6):276-283

This narrative review of current clinical trials for adult populations finds that liraglutide and semaglutide, indicated in the treatment of type 2 diabetes, are also indicated for obesity treatment at higher doses (liraglutide 3.0 mg daily and semaglutide 2.4 mg weekly for obesity, and up to 1.8 mg daily and 1.0 mg weekly, respectively, for type 2 diabetes). When used at recommended doses for obesity management in people without type 2 diabetes, mean weight losses in clinical trials are 6–8 kg (~6% placebo-subtracted) for liraglutide and 15–18 kg (~13% placebo-subtracted) with semaglutide. The review defines the adverse effects of GLP-1 receptor agonists as predominantly gastrointestinal. Nausea (40%) and diarrhoea (21%) are the most common adverse effects for liraglutide 3.0 mg, with a similar adverse event profile for semaglutide 2.4 mg. A gradual dose escalation is recommended to minimise these effects. Nausea is usually transient and mild and is most common shortly after treatment initiation and during dose escalation. For people with obesity, weight loss of 5% or more has health benefits, and greater weight loss is associated with progressive improvements in health and health-related quality of life.

Hampl SE, et al. 'Clinical Practice Guideline for the Evaluation and Treatment of Children and Adolescents With Obesity'. Pediatrics. 2023 Feb 1;151(2):e2022060640

This review of 27 randomized studies and an additional eight observational studies used to inform the US guidelines for the management of severe childhood obesity or obesity with complexities features an analysis of the impact of novel agents (setmelanotide, liraglutide, and the combination phentermine or topiramate). It concludes that the use of pharmacotherapy for children and adolescents who require an additional treatment option to manage their obesity should not be excluded. Children with more immediate and life-threatening comorbidities, those who are older, and those affected by more severe obesity may benefit from pharmacological options. For children younger than 12 years, there is insufficient evidence for use of pharmacotherapy for the sole indication of obesity based on the studies reviewed.

Kelly AS, Auerbach P, Barrientos-Perez M, Gies I, Hale PM, Marcus C, Mastrandrea LD, Prabhu N, Arslanian S; NN8022-4180 Trial Investigators. A Randomized, Controlled Trial of Liraglutide for Adolescents with Obesity. N Engl J Med. 2020 May 28;382(22):2117-2128

This randomized, double-blind trial which consisted of a 56-week treatment period and a 26-week follow-up period enrolled 125 adolescents aged 12-18 years to daily liraglutide 3.0mg with lifestyle therapy and another 126 to subcutaneous placebo once daily with lifestyle therapy. It concludes that in adolescents with obesity, the use of liraglutide (3.0 mg) plus lifestyle therapy led to a significantly greater reduction in the BMI standard-deviation score than placebo plus lifestyle therapy. A reduction in BMI of at least 5% was observed in 51 of 113 participants in the liraglutide group and in 20 of 105 participants in the placebo group (estimated percentage, 43.3% vs. 18.7%), and a reduction in BMI of at least 10% was observed in 33 people in the intervention group versus nine in the placebo group, respectively (estimated percentage, 26.1% vs. 8.1%). A greater reduction was observed with liraglutide than with placebo for BMI (estimated difference, -4.64 percentage points) and for body weight (estimated difference, -4.50 kg [for absolute change] and -5.01 percentage points [for relative change]). After discontinuation, a greater increase in the BMI standard-deviation score was observed with liraglutide than with placebo (estimated difference, 0.15; 95% CI, 0.07 to 0.23). More participants in the liraglutide group than in the placebo group had gastrointestinal adverse events (81 of 125 [64.8%] vs. 46 of 126 [36.5%]) and adverse events that led to discontinuation of the trial treatment (13 [10.4%] vs. 0). Few participants in either group had serious adverse events (3 [2.4%] vs. 5 [4.0%]).

Lister, N.B., Baur, L.A., Felix, J.F. et al. Child and adolescent obesity. Nat Rev Dis Primers 9, 24 (2023)

This review of the evidence for GLP1 receptor agonist use for obesity comments on findings from Europe and the USA. It notes outcomes for liraglutide in children 12 years and above, finding that liraglutide delivered subcutaneously daily at a higher dose than used for T2DM resulted in a 5% better BMI reduction than placebo after 12 months. Semaglutide, another GLP1 receptor agonist, delivered subcutaneously weekly in adolescents demonstrated 16% weight loss after 68 weeks of treatment, with modest adverse events and a low drop-out rate. Subcutaneous tirzepatide weekly in adults with obesity resulted in 20% weight loss over 72 weeks. A study of the use of tirzepatide in adolescents with T2DM has been initiated but results are not expected before 2027. No trials of tirzepatide are currently underway in adolescents with obesity but without T2DM. Hypothalamic obesity is difficult to treat. Setmelanotide is a MC4R agonist that reduces weight and improves quality of life in most people with LEPR and POMC mutations. In trials of setmelanotide, 8 of 10 participants with POMC deficiency and 5 of 11 with

LEPR deficiency had weight loss of at least 10% at 1 year. The mean percentage change in most hunger score from baseline was −27.1% and −43.7% in those with POMC deficiency and leptin receptor deficiency, respectively.

Weghuber D, Barrett T, Barrientos-Pérez M, Gies I, Hesse D, Jeppesen OK, Kelly AS, Mastrandrea LD, Sørrig R, Arslanian S; STEP TEENS Investigators. Once-Weekly Semaglutide in Adolescents with Obesity. N Engl J Med. 2022 Dec 15;387(24):2245-2257

This double-blind, parallel-group, randomized, placebo-controlled trial, enrolled adolescents 12 to <18 years of age with obesity (a body-mass index [BMI] in the 95th percentile or higher) or with overweight (a BMI in the 85th percentile or higher) and at least one weight-related coexisting condition. 201 participants were randomly assigned in a 2:1 ratio to receive once-weekly subcutaneous semaglutide (at a dose of 2.4 mg) or placebo for 68 weeks, plus lifestyle intervention. Once-weekly treatment with a 2.4-mg dose of semaglutide plus lifestyle intervention resulted in a greater reduction in BMI than lifestyle intervention alone.

The mean change in BMI from baseline to week 68 was −16.1% with semaglutide and 0.6% with placebo (estimated difference, −16.7 percentage points; 95% confidence interval [CI], −20.3 to −13.2; P<0.001). At week 68, a total of 95 of 131 participants (73%) in the semaglutide group had weight loss of 5% or more, as compared with 11 of 62 participants (18%) in the placebo group (estimated odds ratio, 14.0; 95% CI, 6.3 to 31.0; P<0.001). Reductions in body weight and improvement with respect to cardiometabolic risk factors (waist circumference and levels of glycated hemoglobin, lipids [except high-density lipoprotein cholesterol], and alanine aminotransferase) were greater with semaglutide than with placebo. The incidence of gastrointestinal adverse events was greater with semaglutide than with placebo (62% vs. 42%). Five participants (4%) in the semaglutide group and no participants in the placebo group had cholelithiasis. Serious adverse events were reported in 15 of 133 participants (11%) in the semaglutide group and in 6 of 67 participants (9%) in the placebo group.

59 th EASD Annual Meeting of the European Association for the Study of Diabetes . *Diabetologia* 66 (Suppl 1), 1–536 (2023)

This list of abstracts contains citations for novel research on obesity treatment presented at the 2023 Annual Meeting of the European Association for the study of Diabetes. It contains several overviews of phase 1, phase 2 and other clinical trials of GLP1 agonists for obesity, with and without other comorbid conditions including diabetes in diverse cultural groups and ages, with generally favourable outcomes for weight reduction over trial periods when administered at higher doses required for obesity treatment.