Who's Watching the Food Giants?

Accountability in Food Systems Governance.

A structured integrative review of statutory food policy instruments across the WHO European Region and Latin America.

EUPHA
EUROPEAN PUBLIC HEALTH ASSOCIATION

This report was produced in partnership with Healthy Food Healthy Planet (HFHP), through a funded initiative under the HFHP programme. Healthy Food Healthy Planet is a movement building organisation focused on transforming food systems in Europe. It brings together civil society and funders across Europe to foster more impactful collaboration and catalyse a stronger and more cohesive movement, paving the way towards a just, sustainable and healthy food system.

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June 2026

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Executive summary

Food systems are simultaneously the world's largest driver of preventable mortality and one of its greatest sources of greenhouse gas emissions. The corporations that govern what billions of people eat remain, in most jurisdictions, only loosely accountable to any public authority. This review asks a pointed question: when governments have tried to change that, what actually worked?

Drawing on 87 peer-reviewed and grey literature studies across the WHO European Region and Latin America, this review evaluates six categories of statutory food policy, front-of-pack labelling, marketing restrictions, fiscal measures, mandatory reformulation, public procurement standards, and retail placement rules, using the narrow accountability framework of Bovens (2007) as an analytical lens. That framework demands four things of any genuine accountability arrangement: a clearly identified actor, a forum with real authority, a precisely defined obligation, and consequences credible enough to alter behaviour.

Where statutory instruments imposed enforceable obligations with precise standards and credible monitoring, food companies reformulated products at scale, withdrew unhealthy foods from school environments, and restructured product portfolios. Where obligations were broad, enforcement was delegated, or consequences were implausible, the response was marginal or absent.

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A key finding is that effectiveness is less determined by policy type than by the strength of the accountability framework embedded within it: a marketing restriction with comprehensive time-band coverage outperforms one limited to programme adherence, and a tiered sugar levy with credible enforcement outperforms a flat-rate tax without reformulation incentives. The evidence on saturated fat and sodium remains thinner than on sugar, pointing to a systematic gap in nutrient profiling ambition. And across all domains, the reviewed studies evaluate product-level responses only - no jurisdiction has yet developed the

portfolio-level accountability instruments that would prevent structural substitution.

> The challenge ahead is twofold. The first is implementation: applying what is already known about effective product-level regulation with greater rigour, broader scope, and genuine enforcement. The second is institutional invention: designing the portfolio-level and sustainability-linked accountability mechanisms that the evidence points toward but that no jurisdiction has yet fully articulated.

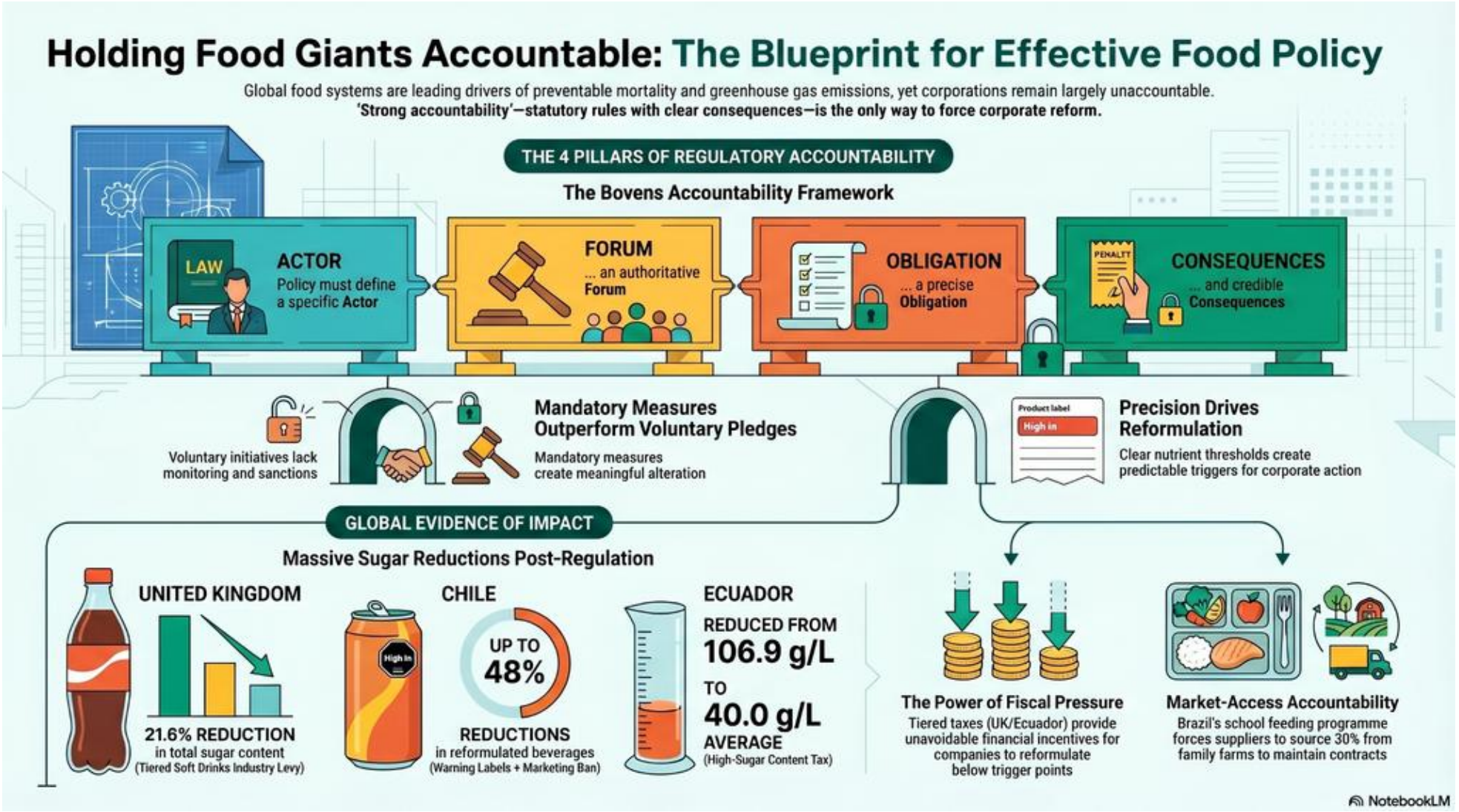
This review proposes a seven-feature model regulatory accountability framework as a practical basis for that work. The political and technical building blocks exist. The question is whether the institutions charged with protecting public health are prepared to use them.

Keywords

Corporate accountability · Food systems governance · Front of pack labelling · Sugar sweetened beverage taxation · Marketing restrictions · Mandatory reformulation · Public procurement · Non-communicable disease prevention · Latin America · WHO European Region · Commercial determinants of health

Holding Food Giants Accountable: The Blueprint for Effective Food Policy

Global food systems are leading drivers of preventable mortality and greenhouse gas emissions, yet corporations remain largely unaccountable.
'Strong accountability'—statutory rules with clear consequences—is the only way to force corporate reform.



1. Introduction

Food systems have emerged as a central nexus of the global health and environmental crises of the twenty-first century (IPES-Food 2017: 8). Unhealthy diets are responsible for an estimated 11 million deaths annually (GBD 2017 Diet Collaborators, 2019), while food systems account for approximately 34% of global greenhouse-gas emissions (Crippa et al., 2021). At the centre of this system lie large transnational food corporations whose economic and political influence shapes both dietary patterns and environmental outcomes (Slater et al., 2024). A relatively small number of multinational companies control substantial segments of food manufacturing, retail, and global supply chains (Clapp, 2022)[1], shaping both dietary patterns and environmental outcomes. These dynamics are increasingly analysed through the framework of the commercial determinants of health - "strategies and approaches used by the private sector to promote products and choices that are detrimental to health" (Kickbusch et al., 2016: 895).

Yet despite overwhelming evidence on the harms of current food systems[2], regulatory action remains partial, delayed, or structurally constrained. Evidence itself increasingly "functions as an alibi - a means of justifying deferral of decisions" rather than enabling action (Benzian et al., 2026: 11). The persistence of unhealthy food environments therefore cannot be explained by knowledge deficits alone, but must be understood through the political and economic structures that govern action and inaction. Historically, governance of corporate food practices has been dominated by voluntary industry initiatives - self-regulatory marketing codes, reformulation pledges, and sustainability commitments (e.g., Mello et al., 2008; Sharma et al., 2010; Lacy-Nichols & Williams, 2021; Popkin et al., 2021). Evidence consistently shows these arrangements are limited in scope and effectiveness (Global Food Research Program, 2020): weak standards, limited monitoring,

[1] The term "Big 10" refers to the small group of multinational corporations that dominate the global packaged food and beverage sector: Nestlé, PepsiCo, Coca-Cola, Unilever, Mondelez International, Danone, General Mills, Kellogg's, Associated British Foods, and Mars. These firms command extensive brand portfolios and global supply chains, giving them disproportionate global influence (Oxfam, 2013

[2] Across the WHO European Region, approximately 90% of deaths are attributable to non-communicable diseases, many of which are strongly associated with unhealthy commodity industries such as processed food and beverages (WHO, 2025). At the same time, prevailing food production and consumption patterns contribute substantially to climate change, biodiversity decline, and the transgression of planetary boundaries (Rockström et al., 2026). More specifically, approximately half of the world's habitable land is now used for agriculture, resulting in widespread habitat destruction and the displacement of wildlife populations due to the conversion of forests, wetlands, and other natural ecosystems into cropland and pasture (Ritchie & Roser, 2019).

minimal enforcement, and no meaningful sanctions (e.g., Gressier et al., 2025; Boyland et al., 2025; Lacy-Nichols et al., 2023; Kunkel et al., 2015; Ronit & Jensen, 2014). Policy debates have therefore shifted towards binding regulatory interventions designed to establish enforceable obligations on food companies.

While many studies evaluate individual food policies, often focusing on consumer behaviour (e.g., Ammann et al., 2023) or health outcomes (e.g., Fu et al., 2025), limited attention has been paid to how these policies function as corporate accountability frameworks and why regulatory design determines whether they alter corporate practices. Existing reviews have typically categorised food policies by instrument type (e.g., labelling, fiscal measures, marketing restrictions), but have provided limited explanation of why some produce measurable effects on corporate practice while others do not. This review addresses that gap. It proposes that policy effectiveness is better understood through differences in regulatory accountability frameworks, specifically, variation in actor clarity, forum strength, obligation precision, and consequence credibility, than through instrument type alone.

The review asks: **Which regulatory policies hold large food companies legally accountable for the health and sustainability of the foods they sell, and what evidence demonstrates how these policies have been implemented and assessed in terms of their effects on corporate practices and food environments?** To answer this, the review synthesises evidence across major categories of food-environment regulation, labelling, marketing restrictions, fiscal measures, mandatory reformulation, procurement, and retail placement, and identifies which accountability design features most effectively produce corporate behaviour change.

2. Methodology

2.1 Review Design and Rationale

The study was designed as a structured, theory-guided integrative review, combining systematic retrieval with conceptually informed synthesis (Snyder, 2019; Sauer & Seuring, 2023). The research question requires simultaneous engagement with a heterogeneous evidence base, peer-reviewed articles, quasi-experimental evaluations, legal analyses, governance scholarship, and policy reports, which makes a purely systematic approach insufficient. All major design choices were specified ex ante.

Although the review is situated within a policy context, analytical decisions were designed to maintain neutrality. A scoping decision was made to focus on **legal** and **administrative** accountability embedded in statutory regulatory frameworks, where food companies are subject to enforceable obligations monitored by public authorities and backed by potential sanctions. Voluntary or horizontal forms of accountability were excluded. The analytical strategy combines deductive coding, categories derived from Bovens' (2007) constitutive elements of accountability (see Annex 2), with inductive refinement based on cross-case variation.

2.2 Eligibility Criteria

Policies were included where they constituted legally binding statutory instruments [3] targeting food companies; established vertical accountability relationships between actor and forum; incorporated monitoring mechanisms; and contained enforceable sanctioning provisions. Studies were included where they examined implementation, enforcement, corporate behavioural adaptation, or measurable effects on food environments, health outcomes, or sustainability indicators. Voluntary pledges and self-regulatory codes were excluded. Such initiatives frequently operate as policy substitution strategies and lack enforceable obligations (Global Food Research Program, 2020). The temporal scope was defined

[3] In this review, the terms regulatory policy, regulation, law, and statutory instrument are used interchangeably to refer to binding legal rules that impose obligations on corporate actors and enable oversight by authorised public forums. Where the analysis refers to regulatory regimes or legal regimes, this denotes the broader institutional configuration of rules, authorities, monitoring procedures, and enforcement mechanisms through which such regulatory policies operate.

as 2005 onwards, reflecting the post-WHO Global Strategy generation of food-environment regulations (Waxman & World Health Assembly, 2004).

2.3 Search Strategy

Search design followed principles of question-method alignment for complex evidence synthesis (Kastner et al., 2016) and typological guidance on review families (Sutton et al., 2019). Searches were conducted in PubMed and Scopus and supplemented by structured Google searches targeting institutional reports from WHO, OECD, EU institutions, national ministries, and public health authorities.

Search strings combined four conceptual clusters: **regulatory instruments** (e.g., "tax", "levy", "labelling", "marketing restriction", "reformulation mandate", "procurement regulation", "retail law"); **corporate actors** (e.g., "manufacturers", "retailers", "beverage companies"); **implementation and evaluative terminology** (e.g., "enforcement", "compliance", "evaluation", "difference-in-differences", "interrupted time series"); and jurisdictional identifiers corresponding to the refined **geographical scope**. Both English and official governmental country names were incorporated to enhance retrieval precision (e.g., "Argentina" and "República Argentina"; "United Kingdom" and "United Kingdom of Great Britain and Northern Ireland").

Searches were conducted in English. Spanish-language sources emerging from Latin American jurisdictions were retrieved, translated, and analysed where eligible, supplemented by cross-referencing with secondary policy databases to ensure interpretive accuracy.

2.4 Screening

The initial search identified 1,350 records. After removal of 72 duplicates, 1,278 unique records underwent title and abstract screening against pre-specified criteria. Of these, 153 records advanced to full-text assessment under the original global scope. Thirty-two records were excluded at full-text stage for reasons including absence of implemented statutory mechanisms, inaccessible full texts, language constraints beyond translation capacity, descriptive background without implementation or evaluation evidence, and exclusive focus on consumer perceptions. This resulted in 121 eligible studies under the global scope. Geographical refinement to the WHO European Region and Latin America reduced the analytical corpus to 87 studies.

2.5 Data Extraction and Coding

Data extraction used a pre-specified matrix (see Annex 2) capturing regulatory configuration, corporate obligations, monitoring arrangements, enforcement mechanisms, and corporate behavioural responses. Health alignment was operationalised against WHO (2026) benchmarks[4] for population-level intake of free sugars (≤ 10% total energy), saturated fat (≤ 10%), trans-fatty acids (≤ 1%), and sodium (≤5 g salt/day equivalent), and supplemented with NOVA-based processing indicators[5] [6] . Sustainability alignment was coded separately through diet-pattern proxies - portfolio shifts toward plant-based products, reductions in animal-source foods - and direct environmental indicators[7] were reported.

2.6 Validity and Procedural Safeguards

Construct validity was ensured by restricting inclusion to statutory instruments that create enforceable actor-forum relationships, distinguishing legally grounded accountability from voluntary corporate social responsibility (CSR) or reputational

[4] Where policies employed nutrient profiling criteria, these were evaluated in relation to international standards and established profiling models (e.g., the Pan American Health Organization Nutrient Profile Model).

[5] The NOVA classification categorises foods according to the extent and purpose of industrial processing, distinguishing minimally processed foods, processed culinary ingredients, processed foods, and ultra-processed foods (Monteiro et al., 2019). The framework is widely used across the scientific community and by international organisations such as WHO and FAO to monitor dietary patterns and inform public health policy. Subsequently, ultra-processed foods are industrial formulations composed largely of substances extracted or derived from foods and assembled through multiple industrial processes that can alter the food matrix, texture, and sensory properties & enhance shelf-life and convenience, producing energy-dense and hyper-palatable products that promote faster eating rates and increased energy intake (ibid.). Experimental evidence shows that individuals consume significantly more calories when eating ultra-processed diets compared with minimally processed diets, even when nutrient composition is matched (Dicken & Batterham, 2024).

[6] Large prospective cohort studies and meta-analyses have consistently reported positive associations between higher UPF consumption and risks of obesity, cardiovascular disease, type 2 diabetes, certain cancers, and all-cause mortality (Lane et al., 2024; Srour et al., 2019; Pagliai et al., 2021). At the population level, ultra-processed foods now account for a substantial share of dietary intake across high-income countries; across the European Union they contribute roughly one quarter of total energy intake on average, with substantially higher shares in some Member States (Mertens et al., 2022). These trends have intensified public health concern about the role of ultra-processed products in shaping dietary risk environments (Food Policy Coalition, 2025).

[7] Environmental indicators considered in coding reflect widely used measures of food-system sustainability, including greenhouse gas emissions, land use, water use, and biodiversity impacts associated with food production. However, because regulatory food-environment policies typically act on corporate supply decisions rather than primary agricultural production, sustainability alignment in this review is primarily operationalised through observable corporate-level outcomes. These include shifts in product portfolios toward plant-based foods, reductions in the share of animal-source products, the introduction or expansion of alternative protein categories (e.g., plant-based, fungal, microbial, or cultivated proteins). Such portfolio changes are relevant because dietary composition is a major determinant of environmental pressures in food systems (Poore & Nemecek, 2018). Similarly, further studies indicate that shifts toward plant-forward dietary patterns are among the most effective strategies for reducing the environmental footprint of food systems while supporting population health (EAT-Lancet Commission, 2019; Rockström et al., 2025). Consequently, where evaluations report environmental outcomes directly, such as estimated changes in emissions, land use, water use, biodiversity indicators, or composite sustainability scores, these are recorded alongside portfolio changes.

signalling. Where available, quasi-experimental designs (interrupted time series, difference-in-differences) were prioritised, but qualitative implementation studies and legal analyses were incorporated alongside quantitative evaluations. Given single-reviewer screening, inclusion criteria were operationalised prior to searches, ambiguous records were conservatively retained, all exclusion decisions were documented contemporaneously, and a pre-specified coding matrix was applied consistently.

3. Theoretical Framework

This review is theoretically anchored in Bovens' (2007) narrow conception of accountability; a relationship between an actor and a forum in which the actor is obliged to explain and justify conduct, the forum can pose questions and pass judgement, and the actor may face consequences (idem: 447-450). Accountability thus presupposes three elements: **information** (answerability), **debate** (judgement), and **consequences** (sanction or correction). This review focuses on legal and administrative accountability embedded in statutory frameworks, where food companies face legally defined obligations monitored by public authorities with formal sanctions[8].

Crucially, accountability is analytically distinct from transparency, responsibility, or participation (Bovens 2007: 448-453). Transparency provides information but does not constitute accountability without an empowered forum capable of interrogation and sanction. Voluntary corporate commitments signal responsibility, yet absent enforceable obligations they remain outside a strict accountability relationship. Accountability implies asymmetry of authority and the possibility of consequence.

3.1 From Corporate Responsibility to Corporate Accountability

The mainstream CRS agenda of the 1990s privileged voluntarism and self-regulation, displacing demands for binding legal control (Utting, 2008). Corporate

[8] Bovens (2007) further differentiates between political (parliamentary scrutiny), legal (courts or tribunals), administrative (regulatory authorities or inspectorates), professional (peer-based oversight), and social accountability (civil society, media, or advocacy organisations).

accountability, by contrast, requires legal obligation, regulatory oversight, and enforceable consequences. In food systems, many mechanisms proposed or implemented, benchmarking, voluntary reporting, public pledges, enhance transparency but do not create legally structured actor-forum relationships. Kraak et al. (2014) identify systematic weaknesses in voluntary nutrition governance, including absent sanctioning mechanisms; Dorado et al. (2021) show that arrangements lacking enforceable oversight risk entrenching power asymmetries.

Recent international initiatives calling for stronger corporate engagement in food systems transformation explicitly refer to the need to "establish and strengthen accountability mechanisms" (United Nations Food Systems Coordination Hub, 2024).

3.2 Guiding Questions

Following Bovens (2007: 450-452), the unit of analysis is the legally constituted accountability framework embedded within a regulatory policy, reconstructed through five questions:

- **Who is accountable?**
  - In this study, the actor is the corporate entity (e.g., manufacturer, retailer, transnational food company) subject to regulatory obligation.
- **To whom is the actor accountable?**
  - The forum must possess formal authority - typically a public regulatory body, administrative authority, court, or statutory oversight institution.
- **For what is the actor accountable?**
  - The regulatory domain, e.g., product composition, marketing practices, fiscal compliance, environmental performance, supply chain conduct, must be clearly defined and legally specified.
- **By what standards is conduct judged?**
  - Accountability requires pre-defined criteria, benchmarks, or statutory standards against which conduct is assessed.
- **What are the consequences?**
  - There must be the possibility of sanctions, corrective measures, penalties (including trade exclusions), or legal liability.

4. Findings

The findings are organised according to major categories of food-environment regulation. Within each policy domain, the analysis examines the accountability relationship using the four analytical elements proposed by Bovens (2007), actors, forums, obligations, and consequences, followed by a short synthesis identifying emerging patterns in corporate response and policy effects.

4.1 Front-of-Pack Nutrition and Warning Labelling

4.1.1 Accountable actors: Who is being held to account?

Across Chile, Mexico, Peru, Argentina, Ecuador, Colombia, Uruguay and Brazil, the primary accountable actors are manufacturers and brand owners of packaged foods and beverages, frequently representing large transnational corporations and top-selling products covering ≥ 60% of market share (Salgado et al., 2025; Saavedra-Garcia et al., 2023). Mexico explicitly confronted firms such as Nestlé, Kellogg, Hershey, Danone, Unilever, Mars, Coca-Cola, PepsiCo and Grupo Bimbo (Crosbie et al., 2023), demonstrating that these regulatory frameworks are directed squarely at dominant commercial actors shaping national food environments.

In several jurisdictions, differentiation by firm size confirms this structural orientation towards large industry actors. Chile granted a three-year implementation delay for small and very small food industries and exempted microenterprises until June 2026 (Rebolledo et al., 2024), effectively concentrating immediate regulatory pressure on larger companies. Colombia applies obligations to all regulated ultra-processed food (UPF) producers without reported size-based exemptions (Cadena et al., 2025). The consistent targeting of high-market-share packaged foods, particularly sugar-sweetened beverages, cereals, dairy products and processed meats, locates accountability at the level of those firms with the greatest capacity to alter nutrient composition and product portfolios. Thus, front-of-pack labelling (FOPL) regimes do not rely on diffuse “consumer responsibility”

but construct a legally defined accountability relationship with identifiable corporate actors whose product composition decisions are rendered reviewable.

4.1.2 Accountability forums: Who holds actors to account?

The dominant forums are administrative regulators with statutory authority to monitor, question and judge compliance. Ministries of Health (Chile's MoH and SEREMI; Peru's MINSA; Uruguay's MSP; Colombia's Ministry of Health; Ecuador's MSP; Brazil's ANVISA) constitute the primary accountability bodies, often supported by consumer protection and economic authorities (e.g., Mexico's Ministry of Economy (MoE) and the Federal Commission for the Protection Against Sanitary Risks (COFEPRIS), and the Federal Consumer Protection Agency (PROFECO); Crosbie et al., 2023).

Monitoring mechanisms vary in robustness. Chile implemented regional inspections at retail level (Rebolledo et al., 2024), unannounced audits of school kiosks (Massri et al., 2019), and annual implementation reports (Villalobos Dintrans et al., 2020), embedding continuous surveillance within the administrative apparatus. Mexico combined regulatory oversight with enforcement actions including raids confiscating over 9,000 and 370,000 products (Crosbie et al., 2023), although formal sanction issuance remains unclear. Colombia reviews Nutrition Facts Panels and ingredient lists against PAHO-based cut-offs[9] (Forero et al., 2025; Cadena et al., 2025), while Ecuador links sanitary certification to compliance (Sarasty et al., 2023).

Civil society actors also operate as informal social accountability forums. In Mexico, El Poder del Consumidor independently monitored compliance and exposed "double front"[10] packaging tactics (Crosbie et al., 2023). However, these actors lack coercive authority; they operate in the shadow of administrative power.

[9] The Pan American Health Organization (PAHO) Nutrient Profile Model is a regulatory tool used to identify processed and ultra-processed foods that contain excessive levels of nutrients of concern, including free sugars, sodium, total fat, saturated fat, and trans fats. Its thresholds are derived from WHO Population Nutrient Intake Goals and are expressed relative to total energy intake rather than fixed daily amounts, allowing assessment across age groups and dietary patterns. Further information is available at: https://www.paho.org/en/nutrient-profile-model.

10 "[...] they documented that the industry had created 'double fronts' by making the front and back of the product packaging identical with only one side carrying the warning labels. They recommended grocery stores implement monitoring measures to identify double fronts so that products with warning labels are showcased properly and not deceive consumers" (Crosbie et al. 2023).

Consequently, these policy frameworks remain predominantly vertically structured, with administrative bodies exercising interrogation and judgement capacities.

4.1.3 Obligations: What are actors required to do?

Obligations are typically precise, product-level and threshold-based, creating clear legal triggers for regulatory intervention. Across cases, products exceeding defined nutrient cut-offs must display front-of-pack warnings. Chile mandates “ALTO EN” labels for foods exceeding 10 g sugar/100 g solids (5 g/100 mL liquids), 4 g saturated fat/100 g, 400 mg sodium/100 g, or 275 kcal/100 g (Quintiliano et al., 2020). Mexico requires octagonal warnings when sugar or saturated fat account for ≥ 10% of total calories and prohibits health and nutrition claims on labelled products (Villaverde et al., 2023; Cruz-Casarrubias et al., 2021). Colombia adopts PAHO nutrient profile thresholds and requires warnings for any amount of non-nutritive sweeteners (Forero et al., 2025).

In stronger models, labelling is embedded within broader conduct restrictions. Chile prohibits sales of “high in” products in schools and restricts marketing to children (Corvalán et al., 2021; Massri et al., 2019). Argentina similarly restricts marketing and bans school sales of labelled products (Wahnschafft et al., 2024). Mexico prohibits child-targeted advertising and claims for products displaying warnings (Salgado et al., 2025). By contrast, Peru removed prohibitions on certain marketing techniques and retained the possibility of claims, weakening horizontal coherence (Alvarez-Cano et al., 2022; Saavedra-Garcia et al., 2022).

4.1.4. Consequences: What happens if obligations are not met?

The credibility of consequences distinguishes moderate from strong accountability. In Chile, monetary fines can reach US$145,000 and non-compliant retailers face legal action (Rebolledo et al., 2024). Conditional market access, particularly school sales bans, creates powerful commercial incentives for reformulation (Quintiliano et al., 2020). Mexico provides for sanctions ranging from US$2,500 to US$40,000 and demonstrated enforcement through product confiscations (Crosbie et al., 2023). Colombia

combines labelling with escalating ad valorem taxes (10% in 2023 rising to 20% in 2025), strengthening fiscal consequences (Cadena et al., 2025).

Empirically, these consequences have prompted measurable corporate practice change. In Chile, the proportion of "high in" products declined from 70.8% to 52.5% after the final phase (Rebolledo et al., 2025), with sugar reductions of up to 48% in reformulated drinks (Corvalán et al., 2021). Mexico reported reductions of up to -63.1 percentage points in warning prevalence for some categories (Salgado et al., 2025). Peru observed beverage sugar reductions from 9.0 to 5.9 g/100 mL (Saavedra-Garcia et al., 2023). Colombia documented beverage sugar reductions from 8.9 to 4.8 g/100 mL (Cadena et al., 2025). Ecuador's tax-linked regulatory model reduced average sugar content from 106.9 g/L to 40.0 g/L after the high-sugar-content tax (Villacis et al., 2023), illustrating that fiscal coupling strengthens accountability effects.

However, consequences also generated strategic adaptation. Non-nutritive sweetener (NNS) use increased substantially in Chile (Rebolledo et al., 2022), Peru (Saavedra-Garcia et al., 2023), and Colombia (Forero et al., 2025), often offsetting reductions in total sweetness. Some high-saturated-fat categories, notably processed meats, cheeses, and savoury snacks, showed limited reformulation (Rebolledo et al., 2025), suggesting that warning labels generated weaker corporate responses in categories where reformulation is technically more constrained, meanwhile Peru experienced expansion of marketing techniques on "high in" products (Saavedra-Garcia et al., 2022). In Uruguay and Brazil, political delays and design weaknesses limited immediate transformative impact (Ares et al., 2021; Giuberti Coutinho et al., 2022).

4.1.5 Synthesis

Across the reviewed cases, front-of-pack labelling regulations operate primarily through disclosure-based accountability mechanisms. Governments define nutrient thresholds and require manufacturers to publicly disclose when products exceed them, with compliance monitored

by regulatory authorities and backed by enforcement mechanisms. This design shifts reputational risk to companies and creates incentives to avoid warning labels. Evidence across multiple jurisdictions shows that these regimes prompted widespread reformulation strategies, particularly reductions in sugar, sodium, and saturated fat. Companies also adopted strategic reformulation responses, such as substituting sugars with non-nutritive sweeteners or adjusting product portfolios to remain below labelling thresholds. Most evaluations report improvements in the nutritional profile of labelled product categories, suggesting that disclosure requirements can influence product composition at scale. However, the evidence base remains largely focused on product reformulation and sales data. Direct evidence on downstream public health outcomes or broader sustainability effects is not reported in the evaluated studies; these implications are examined in the Discussion.

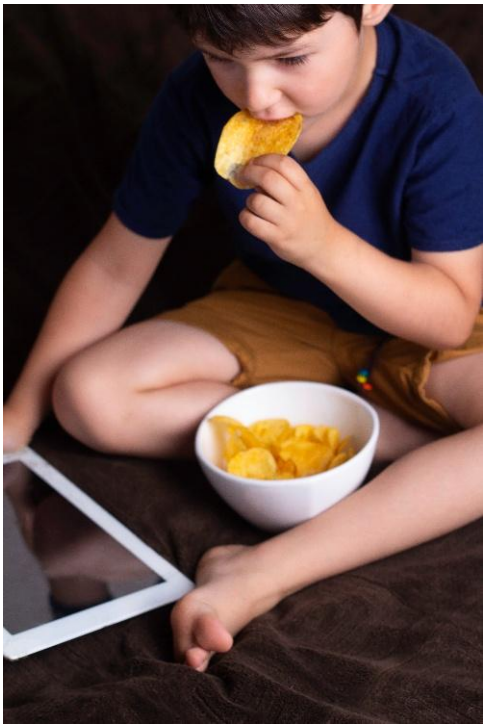
4.2 Marketing Restrictions

4.2.1 Accountable actors: Who is being held to account?

Across Chile, the United Kingdom, Portugal and Denmark, the primary accountable actors are food and beverage companies placing advertising, together with broadcasters and advertising intermediaries responsible for dissemination. In Chile, statutory restrictions under Ley N° 20.606 apply to manufacturers of packaged foods exceeding nutrient thresholds, rendering their products ineligible for child-directed marketing and certain broadcast slots (Quintiliano Scarpelli et al., 2020; Dillman Carpentier et al., 2023). Corporate actors retain the capacity to avoid restrictions through reformulation, underscoring that accountability attaches to product composition decisions rather than merely to advertising format.

In the United Kingdom, restrictions target advertisers of High in Fat, Salt, or Sugar (HFSS) foods within broadcast media, including sponsors of children's programmes (Silva et al., 2013). Portugal's Law No. 30/2019 extends accountability beyond broadcasters to advertisers and legal entities placing food marketing across television, cinema, internet, educational settings and public spaces within defined radii of schools (Gregório et al., 2024; Royo-Bordonada et al., 2025). Denmark adopts

a hybrid model, applying statutory obligations to “economic actors” under the Marketing Practices Act while supplementing this with an industry code covering food companies (Ó Cathaoir, 2017). A consistent pattern emerges: marketing restrictions focus on commercially dominant actors shaping children’s exposure to HFSS and ultra-processed foods, yet the breadth of actors formally captured varies. Chile and Portugal clearly embed corporate marketing conduct within statutory obligations. The UK relies on broadcast-centred regulation, and Denmark’s partial reliance on self-regulation diffuses responsibility. Accountability strength therefore begins to diverge at the level of actor definition.



4.2.2 Accountability forums: Who holds actors to account?

The primary forums are administrative regulatory authorities, though their institutional configuration varies significantly. In Chile, marketing restrictions are embedded within a national statutory framework overseen by health authorities, with implementation linked to nutrient profiling and associated advertising bans (Dillman Carpentier et al., 2023). While detailed enforcement architecture is less elaborated in the empirical evaluations, measurable reductions in advertising prevalence indicate operative regulatory scrutiny.

The United Kingdom operates a co-regulatory model: the Advertising Standards Authority (ASA) enforces compliance under the supervision of Ofcom, which retains ultimate regulatory authority (Silva et al., 2013). This constitutes vertical

accountability, but mediated through delegated oversight rather than direct state inspection. Portugal assigns enforcement to the Directorate-General for Consumer, with authority to initiate administrative offence proceedings and impose sanctions; nutrient thresholds are defined by the Directorate-General of Health (Gregório et al., 2024). Further, Denmark combines statutory oversight by the Consumer Ombudsman and the Danish Radio and Television Board with peer monitoring under an industry forum; however, the latter lacks transparent and systematic enforcement (Ó Cathaoir, 2017).

Monitoring intensity is uneven. Chile's evaluation documented a 64% reduction in "high-in" television advertisements, suggesting effective interrogation capacity (Dillman Carpentier et al., 2023). Portugal's statutory impact assessment identified continued high shares of non-permitted advertising (81% of food and beverage advertisements in certain contexts not meeting the DGS [11] nutrient profile), indicating limits in practical enforcement despite formal authority (Gregório et al., 2024). Thus, while forum structures are formally present in most cases, their operational depth depends on inspection powers, transparency and sanctioning practice.

Chile and Portugal approximate stronger administrative accountability; Denmark's hybrid model dilutes it; and the UK's co-regulation occupies an intermediate position.

4.2.3 Obligations: What are actors required to do?

Marketing restrictions are typically placement- and audience-based, often triggered by nutrient profile thresholds. As aforementioned, Chile prohibits advertising of "high-in" products in media directed at children under 14 and bans such advertisements between 6am and 10pm, while also prohibiting sales in schools (Dillman Carpentier et al., 2023; Quintiliano Scarpelli et al., 2020). Crucially, reformulated products are exempt, reinforcing the regulatory link between marketing eligibility and nutrient composition. The UK prohibits HFSS advertisements in or around programmes specifically made for, or of particular

[11] In Portugal, nutrient profile criteria are established by the Directorate-General of Health (DGS) through Dispatch No. 7450-A/2019 of 21 August. This instrument defines the thresholds for classifying foods and beverages as high in energy and/ or in nutrients of concern (including salt, sugars, saturated fat, and trans fats) for the purpose of regulatory restrictions. The Portuguese model is based on the WHO Regional Office for Europe Nutrient Profile Model (2015), with modifications introduced to align certain nutrient limits and food categories with European Union legislation and the national regulatory context.

appeal to, children under 16 (Silva et al., 2013). Portugal imposes broader cross-media restrictions: advertising of foods exceeding defined energy, sugar, salt, saturated fat and trans fat thresholds is restricted on television (30 minutes before and after child-targeted programmes), in cinemas for under-16 films, online environments directed at minors, and within 100 metres of schools and playgrounds (Gregório et al., 2024; Royo-Bordonada et al., 2025). Denmark's statutory framework requires "good marketing practice", while the industry code sets nutrient profile criteria (e.g., cakes and biscuits not exceeding 10g fat or sugar per 100g; beverages containing no sugar), though compliance mechanisms differ (Ó Cathaoir, 2017).

Thus, the most robust models combine audience-based bans with time-based and setting-based restrictions (Chile, Portugal). Where obligations are confined to programme adjacency (UK) or rely substantially on voluntary codes (Denmark), regulatory scope narrows. The evidence suggests that breadth of obligation, particularly comprehensive time-band coverage, is critical for limiting displacement.

4.2.4 Consequences: What happens if obligations are not met?

Consequences range from loss of advertising access to formal financial penalties, with accountability strength contingent on credibility and enforcement. In Chile, high-in[12] advertising declined by 64% across television following implementation, and high-in purchases fell by 3.5% in calories, 10.2% in sugar and 3.9% in saturated fat (Taillie et al., 2021; Dillman Carpentier et al., 2023). These behavioural shifts indicate that marketing ineligibility constitutes a material commercial consequence. However, high-in advertisements were not fully eliminated, signalling partial compliance. Moreover, in the UK, co-regulation resulted in a £15.2 million decrease in television HFSS advertising expenditures, though reductions were partially offset by displacement to other media (Silva et al., 2013). Further, Portugal's law specifies fines ranging from €1,750 to €45,000 depending on the offender (Gregório et al., 2024). Yet empirical evaluation found that children's overall exposure to unhealthy food advertising did not decline and that weekly unhealthy advertisements increased by 25% in 2022 (Royo-Bordonada et al., 2025). Continued

[12] Throughout this section, Chile's regulatory category "high-in" is used equivalently to the HFSS classification employed in European jurisdictions.

high shares of non-permitted advertising near schools and online suggest enforcement gaps or design loopholes, particularly where restrictions do not cover all time bands. Denmark's statutory authorities possess credible enforcement powers, including licence withdrawal, but the industry code lacks sanctions and operates with limited transparency (Ó Cathaoir, 2017). Consequently, overall accountability strength is weakened by reliance on self-regulation.

4.2.5 Synthesis

Marketing restrictions operate through promotion-based accountability, legally constraining the ability of companies to advertise foods exceeding specified nutrient thresholds, particularly to children. These regulations typically rely on nutrient-profiling systems and are enforced through monitoring of advertising practices across regulated media environments. Evidence indicates that such policies resulted in significant reductions in advertising exposure for unhealthy food products, particularly in broadcast media. The contrast between Chile and Portugal illustrates that breadth of temporal coverage is likely decisive: Chile's near-total broadcast ban left no compliant time slot for displaced advertising, whereas Portugal's programme-adjacency model created displacement opportunities that empirical evaluation confirmed were exploited. This suggests that partial time-band restrictions may be insufficient to constrain corporate marketing behaviour in the absence of comprehensive cross-media coverage and robust inspection capacity. Further corporate responses included reformulating products to meet regulatory criteria, shifting advertising toward compliant products, or redirecting marketing to less regulated channels such as digital platforms. While studies consistently report declines in children's exposure to unhealthy food marketing, the evidence linking these changes to measurable improvements in dietary behaviour remains limited, largely because most evaluations were designed to assess advertising exposure rather than downstream consumption outcomes. As a result, the effectiveness of marketing restrictions appears strongest at the level of corporate promotional practices, with more uncertain downstream effects on consumption patterns.

4.3 Fiscal Measures

4.3.1 Accountable actors: Who is being held to account?

Across France, Hungary, Ireland, Portugal, the United Kingdom, Poland, Mexico, Ecuador and Chile, fiscal measures construct accountability primarily at the level of manufacturers, importers and first domestic sellers of taxed products. In France, the soda tax is "levied on manufacturers or importers of SSBs" (Etilé et al., 2021); in Hungary, liability falls on the manufacturer or first domestic seller (UK Health Forum, 2019); in the UK, the Soft Drinks Industry Levy (SDIL) charges "manufacturers and importers" (Scarborough et al., 2020); and in Mexico, the excise tax "has to be paid by the producer" (Colchero et al., 2015).

Although framed as price instruments, these regulatory approaches place the initial legal obligation squarely on upstream corporate actors rather than on consumers. Actor concentration is frequently high: in Hungary, the top 35 companies account for 83% of Public Health Product Tax (PHPT) revenue (National Institute of Pharmacy and Nutrition, 2019). Even where SMEs were invoked rhetorically in opposition (Hungary), fiscal incidence data indicate that dominant firms bore the majority of liability. Thus, fiscal instruments establish a clear actor: commercially significant beverage and processed food producers whose product composition and pricing decisions determine tax exposure. However, retailer pass-through behaviour (Ireland; UK; France) demonstrates that downstream actors mediate practical consequences, complicating the accountability chain.

4.3.2 Accountability forums: Who holds actors to account?

The principal forums are political-legislative bodies that enact tax statutes and fiscal authorities that administer and collect them. France's tax was incorporated into the 2012 budget law (Law No. 2011-1977); Hungary's Public Health Product Tax (PHPT) was passed by Parliament and administered by the National Tax and

Customs Authority; the UK SDIL is implemented by HM Revenue and Customs; Ireland's Sugar Sweetened Beverage Tax (SSBT) was introduced via the Finance Act 2018; and Mexico's tax is administered by the Servicio de Administración Tributaria (SAT). Ecuador embeds tax liability within the Organic Law to Balance Public Finances and couples it with product licensing oversight by the National Agency for Health Regulation, Control, and Surveillance (ARCSA), which requires health authorisation for market access.

Monitoring capacity varies markedly. Hungary instituted continuous monitoring, laboratory analysis of targeted products and multiple impact assessments (2012; 2014) (National Institute of Pharmacy and Nutrition, 2019), reflecting a relatively dense accountability loop. Portugal created an interministerial taskforce and mandated biannual reporting under the Integrated Strategy for the Promotion of Healthy Eating (EIPAS) (Graça et al., 2018). . By contrast, France's collection system has been criticised as complex and reliant "exclusively on the taxpayer" for calculation (Le Bodo et al., 2022), suggesting weaker interrogation capacity beyond revenue tracking. Mexico combines fiscal monitoring with political contestation: substantial revenue collection (31,945 million pesos in 2014) is documented, yet enforcement of the 8% energy-dense food tax is described as more administratively challenging. Poland, under Act of 14 February 2020 amending certain acts in connection with the promotion of pro-health choices of consumers, relies on mandatory product labelling to operationalise tax thresholds but lacks long-term evaluation data (Wierzejska, 2022). Overall, fiscal measures create vertically structured accountability via tax law. However, the strength of the forum's monitoring and evaluative capacity ranges from robust (Hungary; Portugal; UK) to comparatively thin (France's flat tax; Poland's short-term evidence).

4.3.3 Obligations: What are actors required to do?

Flat-rate designs (France 2012: €0.0716 per litre) impose payment liability but do not differentiate by sugar content (Capacci et al., 2019), thereby weakening reformulation incentives. The 2018 French redesign indexed the tax linearly to added sugar content (Le Bodo et al., 2022), aligning financial liability with nutrient composition. In contrast, tiered designs, such as, UK SDIL (£0.24 per litre for >8 g/100 mL; £0.18 for 5-8 g; zero below 5 g); Ireland (€16.26/hl for 5-8 g; €24.39/hl ≥8 g); Portugal (€8.22 or €16.46 per 100L depending on 8 g/100 mL threshold); Poland (PLN 0.5 per litre plus PLN 0.05 per excess gram; juice-based exemptions), explicitly

condition liability on sugar density. Hungary extends this logic across sugar, salt and caffeine thresholds, applying excise rates to multiple pre-packaged foods (National Institute of Pharmacy and Nutrition, 2019). Ecuador combines a 10% ad valorem tax with an additional US$0.18 per 100 g sugar above 25 g/L (Villacis et al., 2023). Mexico applies a peso-per-litre SSB tax and an 8% tax on nonessential foods ≥275 kcal/100g (Batis et al., 2016). Therefore, where thresholds are clear and steep, the obligation creates a calculable incentive to reformulate below trigger points. However, exemptions (e.g., UK fruit juice and milk-based drinks; Mexico's exclusion of 100% fruit juices and artificially sweetened beverages) create substitution spaces that may attenuate nutritional gains or shift portfolios rather than transform them.

4.3.4 Consequences: What happens if obligations are not met?

The core consequence is financial liability, realised through price increases, reformulation pressure or sales decline. Yet the intensity and direction of corporate response diverge across designs. In Hungary, prices rose by an average of 29% and sales of taxable products fell by 27%; approximately 40% of manufacturers reformulated, with 30% removing harmful ingredients entirely and 70% reducing them (UK Health Forum, 2019; Bíró, 2015). The PHPT was revised five times to close loopholes where firms substituted untaxed but similarly unhealthy ingredients - an example of iterative strengthening of accountability. In addition, the UK SDIL achieved a 33.8 percentage-point fall in drinks above the lower levy threshold, with total sugar content in soft drinks decreasing by 21.6%, and sales-weighted sugar concentration falling from 3.9 g/100 mL to 2.8 g/100 mL between 2015 and 2018 (Public Health England, 2019). Notably, "volume sales increased while the sugar content of products fell, leading to a 17% decrease in the total volume of sugars sold over time" (Bandy et al., 2020) - a strong alignment with nutrient-based accountability objectives. Similarly, Ireland observed a 30.2% reduction in sugar intake via carbonates in retail channels and reformulation of leading brands, such as, Fanta, 7Up and Sprite, below the 5 g/100 mL threshold, though ~60% of products showed limited price pass-through (Houghton et al., 2025), weakening consumer-facing signals. Portugal reported an 11% reduction in energy intake from sweetened beverages and a 15% decrease in total sugar consumption from these products (Goiana-da-Silva et al., 2018), but acknowledged attribution uncertainty (Graça et al., 2018). Poland documented composition changes in 62% of analysed beverages, median sugar reductions from 8.6 g to 6.9 g/100 mL in carbonated drinks, and

nearly tripled tax-exempt products (Wierzejska, 2022). Ecuador's HSC scheme produced striking reformulation among major brands (e.g., Fanta 138.10 → 50.00 g/L; Sprite 75.00 → 0.00 g/L), with no analysed brand paying the additional sugar charge after reformulation (Villacis et al., 2023). Mexico achieved a 37% reduction in taxed beverage volume purchases (-108 ml per capita per month), -23% sugar from taxed beverages, and increased water purchases by 16.2% (Pedraza et al., 2019), though absolute reductions were modest and plateaued after three years. France's early flat tax reduced SSB consumption by less than 5% on average, with limited reformulation incentives prior to the 2018 redesign (Le Bodo et al., 2022).

Positioned along the accountability spectrum, flat-rate taxes (France in 2012) exemplify moderate accountability: clear obligation and revenue consequence, but limited behavioural leverage. Tiered, sugar-indexed levies (UK, Ireland, Portugal, Poland, Ecuador) approach strong accountability, combining precise thresholds, measurable reformulation and documented nutrient reductions. Hungary's multi-nutrient PHPT demonstrates strong but administratively demanding accountability, requiring iterative adjustments to prevent gaming. Mexico's dual tax illustrates credible fiscal accountability but highlights enforcement challenges for complex food categories.

4.3.5. Synthesis

Fiscal policies establish corporate accountability through price-based regulatory mechanisms, linking taxation levels directly to product composition, most commonly sugar content. Evidence from multiple jurisdictions indicates that taxes prompted substantial reductions in sugar concentrations in beverages, alongside the expansion of low- or no-sugar product lines and strategic product repositioning. In addition to reformulation, companies frequently responded through portfolio diversification and marketing shifts toward untaxed or reformulated products. Evaluations consistently document declines in purchases of taxed beverages and reductions in sugar intake, suggesting meaningful dietary impacts. Notably, however, Hungary's PHPT is the only fiscal measure in the reviewed corpus to extend liability beyond sugar to saturated fat and salt, making it the most comprehensive in nutritional and environmental scope. While evaluations document substantial reformulation overall, disaggregated data on saturated fat reductions specifically are not reported in the available literature (National Institute of Pharmacy and Nutrition, 2019; Bíró, 2015).

4.4 Mandatory Reformulation Standards and Nutrient Thresholds

4.4.1 Accountable actors: Who is being held to account?

Mandatory reformulation policy designs in Argentina and the Netherlands construct accountability directly at the level of manufacturers of processed foods, with legal compliance tied to product composition rather than marketing or pricing. Argentina's National Sodium Reduction Law (No. 26.905) establishes maximum sodium limits for specified food groups, including meat and meat products, farinaceous foods and soups (Guarnieri et al., 2025). The reformulation obligation evolved from a prior voluntary agreement between the Ministry of Health and large food companies into binding legislation, thereby transforming negotiated commitments into enforceable statutory duties (Allemandi et al., 2015). Similarly, the Netherlands' Commodities Act similarly imposes mandatory salt limits on bread producers nationwide (Temme et al., 2017), without reported size-based exemptions. In both jurisdictions, accountability attaches to upstream producers whose formulation decisions determine compliance. However, coverage breadth diverges significantly: Argentina regulates multiple categories, whereas the Netherlands' mandatory threshold applies only to bread.

4.4.2 Accountability forums: Who holds actors to account?

The primary forums are administrative and regulatory authorities rather than courts. In Argentina, the Ministry of Health and food regulatory authorities (operating through the Argentine Food Code[13]) oversee implementation, with sodium content mandatorily declared on nutrition information panels. Monitoring has been sustained through repeated academic and civil society analyses (2014; 2019; 2022-2024), documenting compliance trends (Allemandi et al., 2015; Guarnieri et al., 2024; 2025). Formal penalties are specified - fines up to one million pesos and suspension of operations for one to five years (CSPI, 2016), yet empirical documentation of enforcement actions is limited. In the Netherlands, the Commodities Act embeds salt thresholds in statutory regulation, with monitoring commissioned to the National Institute of Public Health and the Environment (RIVM) by the Ministry of Health, Welfare and Sport (Temme et al., 2017). While

[13] The Argentine Food Code (Código Alimentario Argentino (CAA)), adopted through Law No. 18,284 (1969), serves as Argentina's central federal framework regulating the production, processing, distribution, and commercialisation of food and beverages, establishing binding sanitary and quality standards for both domestic and imported products.

monitoring infrastructure is clearly institutionalised, the documentation does not describe specific inspection architecture or sanctioning practices, and no fines are reported in relation to salt limits. Accordingly, both systems establish administrative accountability through legally defined maxima and state-commissioned monitoring. However, Argentina specifies sanctions explicitly, whereas the Dutch model foregrounds monitoring but leaves enforcement instruments less visible in the evaluated literature. The operational density of the forum thus differs despite formal statutory status in both cases.

4.4.3 Obligations: What are actors required to do?

Obligations are framed as quantitative nutrient ceilings. Argentina sets maximum sodium limits across defined food categories and requires sodium declaration on packaging. The law covers meat and meat products, farinaceous foods and soups, later embedded alongside front-of-pack warning legislation (Guarnieri et al., 2025). Notably, the statutory limits were initially aligned with previously negotiated voluntary targets, meaning that the legal threshold did not substantially exceed pre-existing industry commitments (Allemandi et al., 2019). The Netherlands' Commodities Act established progressive salt reductions in bread: from 2.5% (2009) to 1.8% per 100 g dry matter by January 2013, equivalent to approximately 1.15 g salt per 100 g bread (Temme et al., 2017). This staged tightening represents an iterative lowering of permissible maxima within a single product category. In both jurisdictions, compliance is binary: products exceeding controlled values are unlawful. Yet stringency varies. Argentina's thresholds have been characterised as "permissive and outdated," with over 50% of products exceeding stricter PAHO 2025 targets despite complying with national law (Guarnieri et al., 2025).

4.4.4 Consequences: What happens if obligations are not met?

Argentina provides for significant sanctions, fines up to one million pesos and potential suspension of operations, suggesting strong formal consequences. Empirically, non-compliance declined over time: 15.1% of products exceeded limits in 2014; 5.7% in 2019; 6.4% in 2022; and 5.8% in 2024 (Allemandi et al., 2015; Guarnieri et al., 2024; 2025). Significant sodium reductions occurred in 11 of 66 categories (16.7%) between 2022 and 2024, including condiments (-9,083 mg/100 g) and bread (-167 mg/100 g). However, high compliance must be interpreted cautiously: approximately 85% of products were already within legal limits before the law

entered into force because maxima mirrored earlier voluntary agreements. Moreover, large shares of products, e.g., 76.7% of savoury snacks relative to PAHO 2025 targets [14], remain above more stringent health-oriented benchmarks. Accountability strength is therefore partly undermined by low ambition in threshold design. In the Netherlands, the narrow product scope constrains systemic dietary impact, and explicit sanctioning mechanisms are not described. Accountability is thus structurally present but limited in reach.

4.4.5 Synthesis

Mandatory reformulation policies represent a form of composition-based accountability, directly regulating the permissible nutrient content of food products. Unlike disclosure approaches, these regulations establish legal limits on specific nutrients, meaning that products exceeding thresholds cannot be sold unless reformulated. Evidence suggests that such policies prompted industry-wide reformulation efforts, particularly reductions in salt and industrial trans fats across multiple product categories. Because compliance is required for market access, corporate responses are relatively uniform compared to other policy instruments.

4.5 Public Procurement and School Food Standards

4.5.1 Accountable actors: Who is being held to account?

Public procurement regimes in Ecuador, Brazil, Colombia, the United Kingdom, Costa Rica, Honduras and Hungary reconfigure accountability by positioning the state as a dominant market actor whose purchasing power conditions corporate eligibility. The accountable actors are suppliers, caterers, concessionaires and contracted food companies seeking access to public institutional markets. In Brazil, suppliers to the National School Feeding Program (PNAE) and the Food Acquisition Program (PAA) include family farmers and other providers, with 30% of PNAE resources legally earmarked for direct purchase from family farming (de Medeiros & da Silva, 2025; Soares et al., 2016). Hungary's Public Catering Decree binds public

[14] Adopted in February 2021, the updated PAHO Regional Sodium Reduction Targets (2021-2025) establish phased maximum sodium thresholds for 16 processed food categories (comprising 75 subcategories), with the objective of achieving a 30% relative reduction in population sodium intake by 2025; the framework envisages an initial 15% reduction by 2022, progressing to 30% by 2025, as part of broader efforts to reduce cardiovascular disease risk. Further information is available at: https://www.paho.org/en/documents/updated-paho-regional-sodium-reduction-targets.

and private catering service providers supplying schools (Kiss et al., 2019; WHO, 2018). Ecuador's National School Meal System (NSMS) governs supplier industries and school canteen operators (Ocaña Navas et al., 2025; Cabrera-Ledesma et al., 2023). Costa Rica targets private kiosk concessionaires operating within public schools (Jensen et al., 2021). The UK Government Buying Standards for Food (GBSF) apply to suppliers, caterers and wholesalers contracting with central government bodies, National Health Service (NHS) trusts and other public institutions (House of Commons, 2021). Colombia's School Feeding Program (PAE) regulates operators competing for public contracts (Zapata & Caicedo-Muñoz, 2024), while Honduras' National School Feeding Program (PNAE) engages private suppliers and corporate partners such as Cargill (Cruz et al., 2021). Unlike labelling or taxation, procurement-based accountability conditions access to a guaranteed public market. Actor inclusion is therefore selective and contractual. Brazil uniquely prioritises small-scale and low-income farmers, reorienting accountability toward inclusive supply chains rather than solely constraining large food corporations. Elsewhere, particularly in the UK and Colombia, accountability attaches primarily to contracted service providers within competitive tendering systems.

4.5.2 Accountability forums: Who holds actors to account?

The forum is predominantly administrative and contractual. In Brazil, federal ministries and the National Supply Company (CONAB) administer procurement and monitor compliance through administrative microdata covering over 108,000 farmers (Casagrande et al., 2024). Hungary assigns monitoring and enforcement to the National Food Safety Office, with routine inspections and national surveys ("Canteen Panorama") (Kiss et al., 2019). Ecuador's system involves the Ministry of Education, Sports, and Culture (MINEDUC), an inter-institutional committee and procurement authority (SERCOP), with surveillance roles for health and agricultural actors (Ocaña Navas et al., 2025). Costa Rica relies

on the Ministry of Health, Ministry of Public Education, school boards and health committees, though monitoring is described as sporadic and unclear (Jensen et al., 2021). Colombia employs information systems (SIMAT) and contractual audits (Zapata & Caicedo-Muñoz, 2024). The UK formally embeds standards in tender specifications and contract conditions, but parliamentary inquiries report minimal monitoring or enforcement of mandatory standards (House of Commons, 2021). Monitoring density therefore varies markedly. Hungary and Brazil exhibit structured, routine oversight; Colombia and Ecuador possess administrative systems but focus predominantly on outputs (rations delivered, coverage) rather than nutritional outcomes; Costa Rica and the UK demonstrate weak or inconsistent enforcement despite formal obligations.

4.5.3 Obligations: What are actors required to do?

Obligations combine nutritional criteria, sourcing requirements and procedural compliance. Brazil mandates inclusion of fruit, vegetables and whole grains; restricts products high in sodium, sugar and fat; and requires that at least 30% of resources be purchased from family farmers (Soares et al., 2016; de Medeiros & da Silva, 2025). Hungary legislates detailed food-based and nutrient standards, daily provision of specific food groups, and prohibition of energy drinks and sweetened soft drinks (WHO, 2018). Ecuador requires that foods sold in canteens contribute to a “varied and healthy diet” and, in territorial modalities, mandates 35% sourcing from family agriculture (Ocaña Navas et al., 2025). Costa Rica establishes explicit nutrient cut-points (e.g., prohibiting pre-packaged foods exceeding 12 g fat, 20 g sugar or 400 mg sodium per 100 g; banning carbonated beverages; prohibiting deep-frying) (Jensen et al., 2021). Honduras defines nutritional adequacy (e.g., 1800 kcal/day; 67 g protein/day) and food safety requirements (Cruz et al., 2021). The UK GBSF integrates mandatory and “best practice” standards across nutrition, sustainability, animal welfare and seasonality, operationalised through tender specifications and a balanced scorecard (House of Commons, 2021). As explained below, the degree of precision in obligations strongly correlates with measurable downstream change.

4.5.4 Consequences: What happens if obligations are not met?

The primary consequence is exclusion from, or loss of access to, public contracts. In Brazil, participation requires registration and compliance; suppliers benefit from

guaranteed markets and fixed prices, and failure to meet criteria jeopardises eligibility (Casagrande et al., 2024). Observed outcomes include increased acquisition of recommended foods ($p = 0.005$), decreased high-sugar products ($p = 0.02$), and increased purchase of legumes and vegetables (Soares et al., 2016). Participation in the Food Acquisition Program (PAA) increased family farmers' production value by 13.1% and income by 4.1% (Casagrande et al., 2024), evidencing synergistic health-sustainability alignment. Hungary reports compliance in 90% of schools regarding sugar, energy and fat standards, reduced deep-frying, increased fruit and vegetable provision, and decreased availability of sugar-sweetened beverages. Enforcement occurs through routine inspections and regulatory revision rather than punitive sanctions, yet compliance levels are high (90%) (WHO, 2018). By contrast, Costa Rica exhibits weak fidelity: 76.6% of assessed kiosk items failed to meet nutrition criteria, monitoring was sporadic, and concessionaires reported profitability losses leading to resignations (Jensen et al., 2021). Ecuador demonstrates partial compliance with substitution toward homemade fried foods and limited sanctioning capacity ("there is no type of sanction... for the nutritional field") (Cabrera-Ledesma et al., 2023). Colombia achieves administrative efficiency, rations delivered and coverage expanded, but lacks evaluation of nutritional impact and reports insufficient corrective controls (Zapata & Caicedo-Muñoz, 2024). The UK GBSF, despite mandatory status for central departments and NHS trusts, lacks routine monitoring and penalties; investigations found substantial non-compliance (House of Commons, 2021).

Positioned on the accountability spectrum, Brazil and Hungary represent comparatively strong procurement accountability: binding legal criteria, systematic monitoring, and observable supply-chain transformation with health and sustainability co-benefits. Colombia and Honduras exhibit moderate, output-focused accountability with limited evaluative depth. Ecuador and Costa Rica demonstrate weak enforcement and implementation gaps despite mandatory design. The UK illustrates high normative ambition but low enforcement credibility, resulting in attenuated accountability.

4.5.5 Synthesis

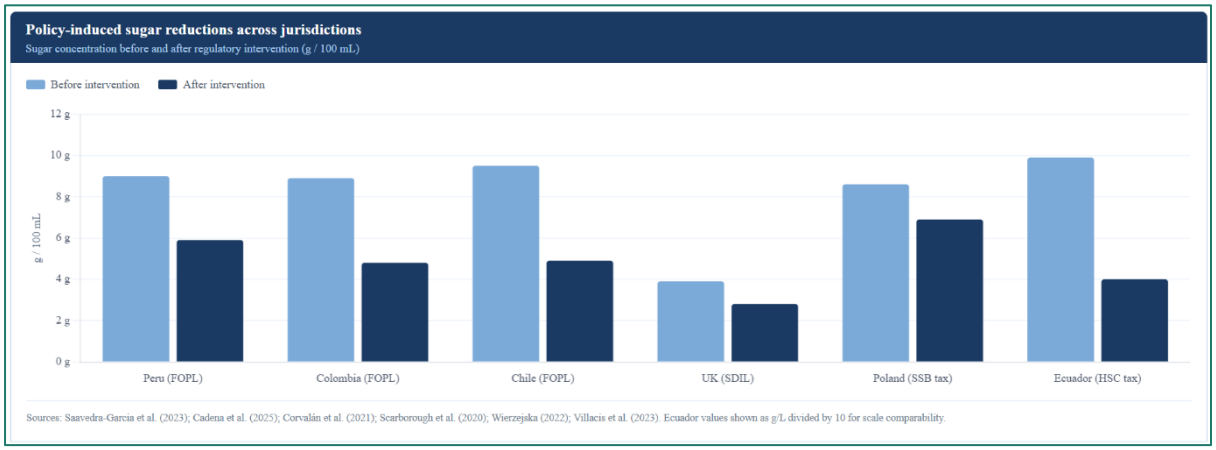
Public procurement policies create market-access accountability, linking participation in government food supply chains to compliance with defined nutrition or sustainability standards. By conditioning contracts on meeting

regulatory criteria, these policies influence the types of products companies supply to schools, hospitals, and other public institutions. Evidence indicates that procurement standards prompted reformulation of existing products and the development of new products tailored to institutional nutrition requirements. In several cases, these policies also increased the availability of healthier or more sustainable foods within regulated food environments. However, the impact of procurement regulations appears largely confined to institutional markets, and evidence on whether these policies stimulate wider corporate changes across commercial product lines remains limited. Evaluations also rarely assess environmental indicators, leaving sustainability impacts insufficiently documented.

4.6 Retail and Placement Rules

Retail and placement rules constitute the least developed accountability mechanism among the examined policy domains. Explicit statutory regulation of in-store product placement appears only in the United Kingdom's Health and Care Act 2022, which introduces restrictions on the placement and price promotion of HFSS products in prominent retail locations such as checkouts and end-of-aisle displays. However, because implementation has been delayed on the grounds that "household budgets are under continuing pressure from the global rise in food prices" (BBC, 2023), empirical evidence on corporate responses or dietary outcomes remains unavailable. In other jurisdictions, retail effects occur indirectly rather than through dedicated placement rules. Chile's Food Labelling and Advertising Law has reportedly generated changes in retail positioning as a secondary effect of warning labels and marketing restrictions, while Hungary's Public Health Product Tax applies to products sold in retail environments but functions as a fiscal rather than spatial regulatory instrument. As a result, evidence on retail-based accountability

remains limited, and the potential effects of placement regulations on corporate practices and food environments cannot yet be assessed.



5. Discussion

This review examined which regulatory policies hold large food companies legally accountable for the health and sustainability of the foods they sell, and what evidence demonstrates how these policies influence corporate practices. The analytical lens was Bovens' (2007) accountability framework - a structured actor-forum relationship involving obligations of explanation and justification, the possibility of interrogation and judgement, and the credible prospect of consequences. Rather than treating regulatory policies as isolated interventions, the review approached them as accountability frameworks embedded within legal and administrative systems. Across jurisdictions and policy categories, a consistent pattern emerges: corporate behaviour shifts most measurably where regulatory frameworks establish clear compliance expectations and credible consequences for non-compliance.

Firms adjust product composition, marketing strategies, or supply chains to minimise regulatory risk. Where these elements are weaker or fragmented,

responses remain limited, symbolic, or narrowly targeted. Transparency alone does not produce behavioural change; it occurs where disclosure is accompanied by institutionalised monitoring and credible penalties. Importantly, corporate responses are not passive reactions but strategic adaptations; firms continuously optimise to comply with, circumvent, or minimise the costs of regulatory intervention.

5.1 Strong Regulatory Accountability

Front-of-pack warning labelling regimes and certain marketing restrictions, particularly in Latin America, most fully articulate the constitutive elements of accountability. Such regimes specify explicit nutrient profiling criteria triggering labelling or marketing prohibitions, require compliance from manufacturers and sometimes retailers, and empower regulatory authorities to monitor and sanction non-compliance. Corporate reformulation has been consistently documented, including reductions in free sugars, sodium, and in some cases saturated fat. Notably, reformulation frequently occurred before full enforcement; anticipatory compliance driven by the credibility of impending sanctions. The 'forum' is therefore not merely the consumer but a legally empowered regulatory authority with sanctioning powers.

Even within strong regimes, however, corporate responses often reflect threshold optimisation. Reformulation concentrates on meeting regulatory cut-offs rather than transforming product portfolios broadly. Binding thresholds can alter product composition but do not necessarily reshape the structural dominance of ultra-processed food categories unless the regulatory object expands beyond individual nutrients to processing levels or portfolio composition.

5.2 Indirect Regulatory Accountability

A second configuration emerges in fiscal measures such as sugar-sweetened beverage levies, where accountability is mediated primarily through economic consequences rather than administrative enforcement. Tax thresholds create direct financial incentives to reduce sugar below specified levels; compliance monitoring is embedded within existing tax administration systems. Because financial liability

is predictable and unavoidable, reformulation often occurs even without extensive inspection regimes. Predictable financial liability can function as a powerful accountability mechanism; equal to punitive sanction in some cases.

However, corporate adaptation under fiscal regimes tends to remain narrow: reformulation targets the taxed nutrient while broader portfolio characteristics, processing levels, or overall nutritional quality may remain unchanged. Substitution strategies emerge as firms maintain palatability while complying with thresholds. Fiscal accountability, while effective for specific nutrient profiles, does not in isolation constitute comprehensive accountability for the healthfulness or sustainability of product portfolios.

5.3 Weak Regulatory Accountability

A third configuration comprises policies establishing disclosure obligations or aspirational standards without robust monitoring and sanctions, such as certain labelling schemes without interpretive thresholds, limited-scope marketing codes, or placement rules that are weakly enforced. Disclosure enhances consumer information, but where no credible enforcement accompanies non-compliance, the accountability relationship is incomplete. Corporate responses frequently involve strategic adjustment rather than substantive transformation: packaging modifications, redirected marketing to digital platforms, or demographic displacement. Transparency without enforceable judgement does not produce structural change.

Accountability strength matrix

Comparing policy types across four Bovens dimensions. Based on reviewed evidence.

Policy type	Actor clarity	Forum strength	Obligation precision	Consequence credibility
Front of pack labelling Latin America (Chile, Mexico, Peru, Colombia)	High	High	High	High
Marketing restrictions Chile	High	High	High	Medium
Fiscal measures, tiered UK, Hungary, Ireland, Ecuador	High	Medium	High	High
Mandatory reformulation Argentina, Netherlands	High	Medium	High	Medium
Public procurement Brazil, Hungary	Medium	High	High	Medium
Marketing restrictions Portugal, UK	Medium	Medium	Medium	Low
Retail and placement rules UK (implementation delayed)	Medium	Low	Medium	Low

High Medium Low Based on Bovens (2007). Scores reflect analytical synthesis of reviewed evidence; not a formal scoring instrument.

5.4 Policy-Induced Corporate Behaviour and Implications for Health and Sustainability

Regulatory accountability frameworks most consistently influence corporate behaviour through changes in product composition. Nutrients constitute administratively tractable objects: they can be quantified, monitored, and linked to compliance thresholds. Sustainability objectives, emissions, land use, biodiversity, are rarely embedded within binding food regulations, even though dietary patterns higher in plant-based foods are consistently associated with both improved health and reduced environmental pressures (Nelson et al., 2016; Mason-D'Croz & Herrero, 2025). The evidence predominantly documents effects on nutritional composition rather than direct sustainability effects. The following sections examine corporate responses across four observable domains: reductions in added and free sugars, reductions in sodium, reductions in saturated fat, and increased availability of minimally processed and plant-based foods.

5.4.1 Reduction of Added and Free Sugars

Across the reviewed cases, reductions in added or free sugars constitute the most consistently (policy target and) documented corporate response to regulatory accountability mechanisms. Such reductions occur across several policy designs, including front-of-pack warning labelling, fiscal measures targeting sugar-sweetened beverages (SSBs), and public procurement standards. Although these instruments operate through different accountability pathways, information disclosure, financial disincentives, or institutional purchasing requirements, they converge in creating incentives for companies to reformulate products or reduce the availability of high-sugar foods and beverages. Evidence from multiple jurisdictions demonstrates measurable reductions in sugar concentrations following regulatory intervention. In Peru, implementation of front-of-pack warning labels was associated with a decline in beverage sugar concentration from 9.0 g/100 mL to 5.9 g/100 mL. Comparable reductions were observed in Colombia (from 8.9 g/100 mL to 4.8 g/100 mL) and Chile, where reformulated beverages reduced sugar content by up to 48% and the share of products classified as "high in" nutrients of concern declined from 70.8% to 52.5%.

Fiscal policies have generated similar reformulation incentives. The United Kingdom Soft Drinks Industry Levy (SDIL) resulted in a 21.6% reduction in total sugar

content of soft drinks, with sales-weighted sugar concentration declining from 3.9 g/100 mL to 2.8 g/100 mL. Comparable trends were documented in Poland, where median sugar concentrations in carbonated beverages declined from 8.6 g to 6.9 g per 100 mL, while in Ecuador several major beverage brands substantially reduced sugar levels (for example, Fanta from 138.1 g/L to 50 g/L and Sprite to 0 g/L). Beyond commercial retail markets, public procurement standards have also influenced corporate practices within institutional food environments. In Brazil's National School Feeding Programme, procurement rules increased purchases of recommended foods while reducing acquisitions of products high in added sugars, thereby reshaping both supplier practices and food availability in schools. Taken together, these findings indicate that regulatory instruments introducing clear nutrient thresholds or economic consequences can generate measurable reductions in sugar levels across segments of the food supply.

5.4.1.1 Health Implications

The public health significance of these reductions can be interpreted in relation to the broader scientific evidence linking excessive sugar intake to cardiometabolic disease. The EAT-Lancet Commission (Rockström et al., 2025) emphasises that excessive intake of added sugars, particularly through sugar-sweetened beverages, is associated with multiple adverse health outcomes. The Commission states that: "Added or free sugars provide no nutritional value and can cause harms when excessively consumed. Intake, particularly in the form of sugar-sweetened beverages, has adverse cardiometabolic effects and has been positively associated with weight gain, type 2 diabetes, coronary heart disease, and total mortality" (idem: 1636). At the population level, diets high in sugar-sweetened beverages are linked to substantial disease burdens. Estimates indicate that approximately 75 000 deaths annually are associated with high consumption of sugar-sweetened beverages (idem: 1657), while unhealthy diets more broadly account for the loss of 3.6 million disability-adjusted life years (DALYs) globally (idem: 1655). Furthermore, excessive sugar intake contributes to the global obesity epidemic, which currently affects more than one billion people worldwide (idem: 1636).

Within this context, policy-induced reductions in sugar concentrations across widely consumed beverage categories may indicate movement towards dietary patterns associated with lower cardiometabolic risk. By reducing the sugar density of commonly consumed products, reformulation can potentially lower aggregate

population exposure to free sugars, particularly when changes occur across large product portfolios. However, evidence from several regulatory contexts also indicates that reductions in sugar are frequently accompanied by substitution with non-nutritive sweeteners (NNS) as manufacturers reformulate products to maintain sweetness while remaining below regulatory thresholds. Although such substitutions reduce caloric sugar content, the broader health implications remain debated. The World Health Organization has noted that long-term consumption of non-sugar sweeteners may be associated with increased risks of metabolic disease and does not appear to provide sustained benefits for weight control (World Health Organization, 2023: 2-4). Consequently, while reductions in added sugars may reduce exposure to one dietary risk factor, the health benefits of reformulation may depend on the overall nutritional profile of reformulated products, including whether sugar reductions are achieved through meaningful improvements in food composition or through substitution with artificial sweeteners.

5.4.1.2 Sustainability Implications

Evaluations of sugar taxes, reformulation requirements and marketing restrictions typically assess outcomes such as product reformulation, sales volumes, or nutrient intake, whereas environmental indicators are rarely incorporated into policy evaluation frameworks. Consequently, existing regulatory evidence demonstrates that nutrients are governed and measured, whereas sustainability outcomes are generally not systematically monitored. Nevertheless, potential environmental implications can be inferred through broader food-system dynamics. Reductions in demand for sugar-sweetened beverages and other discretionary high-sugar products may contribute indirectly to shifts in agricultural production patterns within global sugar markets (OECD/ FAO, 2023). Because sugar is produced at large scale, exceeding 145 million tonnes annually across more than 120 countries, changes in consumption patterns can influence long-term cultivation trends and trade flows (WFF, 2005). The environmental relevance of such shifts is substantial. Sugar-crop expansion has historically been associated with habitat loss, deforestation and ecosystem degradation, particularly in tropical regions where sugarcane cultivation is concentrated (ibid.). Production is also resource-intensive: irrigation requirements for sugarcane cultivation can reach between 7 000 and 45

000 litres of water per hectare, while agriculture already accounts for approximately 70 % of global freshwater withdrawals (ibid.).

Within this broader context, reductions in consumption of discretionary high-sugar products may therefore generate indirect environmental benefits if they contribute to lower demand for sugar crops or substitution toward foods with lower environmental footprints. However, these sustainability implications remain largely implicit within existing policy evaluations, as environmental indicators are rarely incorporated into monitoring frameworks for sugar-reduction policies.

5.4.2 Reduction of Sodium (Salt)

Across the reviewed cases, reductions in sodium constitute another recurring corporate response to regulatory accountability mechanisms. These reductions occur primarily through mandatory reformulation standards, nutrient thresholds embedded in procurement regulations, and certain front-of-pack or fiscal policies that incentivise reformulation of processed foods. Unlike sugar reductions, which frequently occur in beverage categories, sodium reductions typically affect a wider range of processed foods including bread, soups, condiments and snack products, which are among the largest contributors to dietary sodium intake in many countries. Because a substantial proportion of sodium consumed globally originates from processed foods rather than discretionary salt added during cooking (Jachimowicz-Rogowska et al., 2025: 2), regulatory interventions targeting food composition have the potential to influence population sodium intake at scale (WHO, 2024).

Empirical evidence from several countries demonstrates measurable sodium reductions following regulatory intervention. In Argentina, mandatory sodium reduction targets established maximum limits for several processed food categories, leading to a decline in the share of products exceeding legal sodium thresholds from 15.1 % in 2014 to approximately 5-6 % in subsequent monitoring years, with notable reductions observed in condiments and breads. Sodium reductions have also occurred indirectly through institutional procurement standards. Hungary's public catering regulations introduced limits on sodium, sugar and fat content in foods served in schools and other public institutions while restricting high-sodium processed products. Evaluations reported compliance rates of approximately 90% among catering providers, accompanied by reductions

in deep-fried foods and increased availability of healthier options in school menus. Together, these cases suggest that regulatory accountability mechanisms can reshape corporate practices both through direct reformulation requirements and through procurement standards that condition market access to public food environments.

5.4.2.1 Health Implications

High sodium intake is widely recognised as a major dietary risk factor for non-communicable diseases. According to the World Health Organization (2024), excessive sodium consumption increases blood pressure and substantially elevates the risk of cardiovascular diseases, which remain the leading cause of death globally (idem: 1). WHO estimates that approximately 2 million deaths annually are attributable to high sodium intake, highlighting the scale of the associated public health burden (idem: 9). Furthermore, population intake levels in many countries substantially exceed this threshold, in part because a significant proportion of dietary sodium originates from manufactured and processed foods rather than discretionary salt added during cooking (ibid.)

The EAT-Lancet Commission similarly identifies sodium reduction as an important component of healthy dietary patterns. Within its reference diet, sodium intake above recommended levels is associated with increased blood pressure and elevated cardiovascular disease risk, noting that “intake greater than about 2000 mg per day is linearly associated with increased cardiovascular disease risk” (Rockström et al., 2025: 1636). Within this framework, regulatory policies that require reductions in sodium levels across commonly consumed processed foods may contribute to population-level health improvements by lowering exposure to a major dietary risk factor without relying solely on individual behaviour change.

5.4.2.2 Sustainability Implications

In contrast to sugar reduction policies, which may influence demand for agricultural commodities such as sugarcane or sugar beet, sodium reduction policies typically operate through reformulation of processed foods rather than changes in primary agricultural production. Nevertheless, modelling of a proposed UK salt-and-sugar reformulation tax indicates that reformulated products and consumer substitution toward lower-salt alternatives within common food categories could reduce several environmental indicators associated with food

consumption. The modelling estimated reductions of approximately 2-3 % in average daily dietary greenhouse-gas emissions per adult, alongside measurable decreases in land use and water footprints associated with food consumption patterns (The Food Foundation, 2024: 12), demonstrating that relatively small nutritional changes within widely consumed food categories can accumulate to measurable environmental impacts at population scale. These findings align with broader evidence linking healthier diets with environmental sustainability outcomes. However, these environmental effects remain secondary outcomes of nutrition policy rather than direct targets of sodium reduction measures, and the magnitude of environmental impacts is therefore likely to remain modest relative to broader food-system transitions required to achieve global sustainability targets.

5.4.3 Reduction of Saturated Fat

Across the reviewed cases, reductions in saturated fat constitute a more limited but nevertheless observable corporate response to regulatory accountability mechanisms, particularly front-of-pack (FOP) warning labelling systems and nutrient-profiling rules underpinning marketing restrictions. These policies link regulatory compliance directly to product composition, creating incentives for manufacturers to reformulate products in order to remain below defined thresholds and avoid reputational or commercial penalties. The clearest empirical evidence comes from Chile's Food Labelling and Advertising Law (Law 20.606), which requires products exceeding thresholds for nutrients including saturated fat to display "high-in" warning labels and subjects them to marketing and school-sales restrictions (Quintiliano Scarpelli et al., 2020; Corvalán et al., 2021). Following full implementation, the proportion of packaged foods exceeding regulatory nutrient thresholds declined from 70.8% to 52.5%, indicating substantial reformulation across regulated nutrients (Rebolledo et al., 2025). Consistent with this, household purchasing data show reductions in purchases of high-in foods, including a 3.9% decline in saturated fat purchased (Taillie et al., 2021). Similar policy designs in Mexico and Peru have generated extensive reformulation aimed at avoiding warning labels, such as reductions of up to -63.1 percentage points in warning prevalence in some product categories in Mexico, although most evaluations in these countries report changes primarily for sugar rather than saturated fat specifically (Salgado et al., 2025; Saavedra-Garcia et al., 2023). Taken together, the available evidence suggests that nutrient-threshold–based

regulations can contribute to reductions in saturated fat across segments of the packaged food supply, but the empirical literature remains comparatively small and less consistently measured than the evidence for sugar reformulation.

5.4.3.1 Health Implications

Reductions in saturated fat levels in packaged foods have important implications for population health, particularly through their effects on blood lipids and cardiovascular disease (CVD) risk. Evidence indicates that lowering saturated fatty acid intake reduces low-density lipoprotein (LDL) cholesterol and is associated with reduced risk of cardiovascular diseases[15] and coronary heart disease (WHO, 2023). The EAT-Lancet Commission (2025) emphasises that healthy dietary patterns should contain relatively low levels of saturated fats and instead prioritise unsaturated fats from plant-based sources. Within the Commission's planetary health diet, fats are expected to be "primarily unsaturated rather than saturated"[16], reflecting strong epidemiological evidence that replacing saturated fats with unsaturated fats reduces cardiovascular risk (Rockström et al., 2025). At the population level, excessive saturated fat intake remains common in many regions (e.g., United Kingdom (British Medical Association, 2026)), largely because a substantial proportion of dietary saturated fat originates from processed and ultra-processed foods, including baked goods, snacks, confectionery and ready-made meals. Consequently, reductions in saturated fat concentrations within widely consumed processed foods may contribute to meaningful decreases in population exposure to this dietary risk factor.

5.4.3.2 Sustainability Implications

The sustainability implications of saturated fat reduction policies differ from those associated with sodium reformulation, as saturated fats are predominantly derived from animal products such as meat and dairy, and replacing them with plant-based fats, such as vegetable oils, can reduce reliance on resource-intensive livestock production systems (WHO, 2023: 17). Furthermore, these food categories are among the most environmentally intensive components of global food systems, as they

[15] Elevated LDL cholesterol is a key causal factor in atherosclerosis and cardiovascular events (e.g., stroke) (WHO, 2023).

[16] Saturated fats contain no double bonds in their chemical structure and are typically solid at room temperature (e.g., butter, lard, palm oil). Unsaturated fats contain one or more double bonds and are usually liquid oils (e.g., olive oil, sunflower oil). Replacing saturated fats with unsaturated fats lowers LDL cholesterol and reduces cardiovascular disease risk (WHO, 2023).

tend to have substantially higher greenhouse-gas emission intensities due to methane produced during digestion, land-use change for grazing and feed production, and emissions associated with manure management and fertiliser use (United Nations, 2026). Consequently, policies that reduce saturated fat content in foods may generate indirect environmental benefits when they encourage shifts away from animal-based fats toward plant-derived alternatives (Heart of Mersey, 2009).

5.4.4 Increased Availability of Minimally Processed and Plant-Based Foods

Reductions in the availability of ultra-processed foods and corresponding increases in minimally processed or plant-based foods have emerged primarily through public procurement and school food standards, which operate via market-access accountability mechanisms. These policies condition corporate eligibility for supplying food to public institutions, such as schools and hospitals, on compliance with defined nutritional and sourcing standards. In Brazil's National School Feeding Program (PNAE), for example, suppliers must provide meals containing fruits, vegetables and whole grains while limiting foods high in sugar, fat and sodium; critically, at least 30% of procurement budgets must be spent on products from family farming (Soares et al., 2017; de Medeiros & da Silva, 2025). This requirement effectively shifts procurement demand toward minimally processed foods and local agricultural production. Similarly, Hungary's Public Catering Decree mandates provision of specific food groups, including fruits and vegetables, while restricting sugar-sweetened beverages and energy-dense foods in school catering (World Health Organization, 2018), thereby encouraging suppliers to adjust product portfolios and supply chains to meet institutional demand. Evidence indicates that such policies can reshape food availability within regulated settings. In Brazil, the introduction of new procurement criteria increased purchases of recommended foods, including legumes, fruits and vegetables, and reduced purchases of high-sugar products (Soares et al., 2017). Hungary reported compliance with nutritional standards in approximately 90% of schools, accompanied by reduced availability of sugar-sweetened beverages and increased provision of fruits and vegetables in public catering (WHO, 2018). Together, these cases demonstrate that procurement policies can increase the availability of minimally processed foods within

institutional food environments by altering the purchasing practices of large public buyers.

5.4.4.1 Health Implications

Increasing the availability of minimally processed foods has important implications for population health because these foods typically retain their original nutritional composition and contain higher levels of fibre, vitamins and micronutrients than highly processed alternatives (Monteiro et al., 2019: 6-7). In contrast, ultra-processed foods are industrial formulations composed largely of refined ingredients, additives and substances extracted from whole foods, alongside low nutritional density (British Medical Association, 2026: 4-5). High consumption of ultra-processed foods has been associated with increased risks of obesity, cardiovascular disease, type 2 diabetes and certain cancers (British Medical Association, 2026: 4). Consequently, shifts in food environments that increase the availability of minimally processed foods may improve dietary quality by reducing population exposure to energy-dense, nutrient-poor products while encouraging consumption of nutritionally beneficial foods.

Such shifts may also contribute to broader dietary patterns associated with lower risks of non-communicable diseases. Diets rich in fruits, vegetables, legumes and whole grains and lower in red and processed meats, saturated fats and added sugars are consistently associated with reduced risks of cardiovascular disease and premature mortality (WHO, 2021). Increasing the availability of plant-based foods therefore supports dietary patterns aligned with global public health recommendations. For example, fruit and vegetable consumption is associated with lower blood pressure and reduced risks of stroke, heart disease and certain cancers, while higher intake of dietary fibre contributes to improved digestive health and cardiometabolic outcomes (WWF, 2023: 16). However, emerging research also highlights that the health benefits of plant-based diets depend strongly on the degree of processing. While plant-based foods can improve dietary quality, highly processed plant-based products may still contain excessive salt, sugar or fats, meaning that health benefits are greatest when diets emphasise minimally processed foods rather than ultra-processed substitutes (Mutebi, 2024). Within the policy cases reviewed in this study, increases in the availability of minimally processed foods therefore represent a potentially important mechanism through which regulatory interventions may contribute to healthier food

environments, even though most evaluations assess changes in food provision rather than direct health outcomes.

5.4.4.2 Sustainability Implications

Shifts toward greater availability of minimally processed and plant-based foods may also generate environmental benefits because these foods are typically associated with substantially lower environmental impacts than diets dominated by animal-based products. Food systems are responsible for approximately 30 % of global greenhouse-gas emissions (WWF, 2023: 10), and animal-derived foods, particularly red meat and dairy, tend to have significantly higher land requirements than plant-based foods, meaning that dietary transitions toward plant-rich diets can contribute to reducing the environmental footprint of food systems (WHO, 2021: 7). Evidence from dietary modelling further illustrates how such transitions may generate large-scale environmental benefits. For example, analysis of the UK “Livewell” dietary scenario (WWF, 2023: 6, 13) indicates that shifting toward diets richer in plant foods and lower in animal products could reduce food-related greenhouse-gas emissions by approximately 36 % while simultaneously reducing biodiversity loss and land use associated with food production. More broadly, dietary shifts toward plant-rich foods can also support transitions toward more sustainable agricultural systems by reducing demand for livestock feed crops and freeing land for ecosystem restoration or carbon sequestration (Dicken et al., 2025: 18-20). However, the sustainability benefits of such dietary changes also depend on the level of food processing. Highly processed foods often rely on industrial supply chains and input-intensive monoculture production systems that contribute to environmental degradation, whereas minimally processed plant foods typically involve shorter supply chains and fewer resource-intensive processing stages (WWF, 2023: 21). Despite these potential environmental co-benefits, empirical evaluations of food-environment policies rarely measure environmental indicators directly, meaning that the sustainability implications of policy-induced dietary shifts remain insufficiently assessed in the current literature.

6. Limitations

This review adopts a narrow understanding of accountability centred on enforceable obligations and observable corporate behaviour change. While analytically precise, this approach does not systematically examine corporate political activity, regulatory capture, trade constraints, or broader political economy determinants of regulatory design[17]. Policies are assessed in terms of their formal design and documented effects, not as products of power asymmetries or contested governance processes. Similarly, the review does not engage in depth with regulatory capacity, administrative burden, or compliance theory[18]. Although implementation and compliance effects are coded, enforcement intensity, institutional resources, and inter-agency coordination are not independently assessed. Accountability strength is likely co-produced by legal design and administrative context, but the latter is not systematically measured here.

The evidence base is constrained by implementation delays, particularly for retail and placement rules. Durability of reformulation over longer time horizons is under-examined; most evaluations assess short- to medium-term effects. The analysis focuses primarily on aggregate corporate behaviour and does not systematically assess distributional consequences or equity implications[19]. Case coverage is biased toward jurisdictions with stronger research infrastructure, likely under-representing lower- and middle-income settings.

Finally, screening and extraction were conducted within an eight-week period at 0.5 FTE by a single reviewer. Compensatory strategies included pre-specified criteria, conservative retention of ambiguous records, contemporaneous

[17] For analyses of corporate political activity as a structured repertoire of strategies used by firms to influence government outcomes, including lobbying, campaign donations, and stakeholder mobilisation, see Hillman and Hitt (1999) and the updated reconceptualisation by Katic and Hillman (2023). On regulatory capture and the proposition that regulation is often "acquired" and designed primarily for the benefit of the regulated industry, see Stigler (1971). For a political economy perspective on modes of regulatory governance and the relationship between institutional configurations, regulatory processes, and outcomes, see Guidi, Guardiancich, and Levi-Faur (2020).

[18] For conceptualisations of regulatory capacity as the institutional and expertise-based ability of the state to exercise predictable, technically informed oversight, particularly in contexts where privately operated services are contractually governed and monitored through specialised regulatory bodies, see Lodge and Wegrich (2014). On street-level bureaucracy and the discretionary role of frontline public service workers in implementing and enforcing policy, see Lipsky (2010). For compliance theory and the relationship between types of organisational power (coercive, utilitarian, normative) and forms of actor involvement (alienative, calculative, moral), see Etzioni (1975).

[19] Although consumption taxes are financially regressive in incidence (OECD, 2014), their health effects may be progressive. An OECD review concluded that fiscal measures are among the few obesity interventions that consistently generate larger relative health gains for lower-income groups (OECD, 2019).

documentation of exclusion decisions [20], and a pre-specified coding matrix. Residual risks of incomplete capture cannot be fully eliminated.

7. Policy recommendations

Achieving meaningful improvements in population health and food system sustainability requires regulatory frameworks that are not only adopted but also effectively implemented, monitored and evaluated. The findings highlight that policy effectiveness depends on the presence of clear institutional accountability arrangements, measurable policy objectives and robust monitoring systems. Strengthening these elements can improve governments' capacity to track policy implementation, assess behavioural responses by regulated actors and adjust policy design over time. The following recommendations outline priority actions for enhancing the regulatory architecture, indicator frameworks and data systems underpinning food-environment policies.

7.1 Prioritise mandatory regulatory approaches over voluntary governance

Across the reviewed cases, corporate behaviour changed most substantially where regulatory frameworks imposed enforceable obligations, precise standards, and credible monitoring. While this review does not directly compare mandatory and voluntary instruments, voluntary approaches were excluded from the analytical scope, the consistent finding that accountability strength correlates with enforceability aligns with existing literature documenting the structural limitations of self-regulatory governance (Global Food Research Program, 2020; Gressier et al., 2025). Governments should therefore prioritise binding regulatory instruments that establish clear legal obligations for corporate actors. Where voluntary mechanisms are retained, they should be embedded within frameworks that define clear timelines and escalation pathways towards mandatory standards. This direction is

[20] A further limitation concerns case coverage. Although numerous countries and laws meet the formal inclusion criteria (see Annex 1), many were not analysed because no eligible evaluative studies were identified through the predefined search strategy. Their absence reflects lack of accessible or publishable evaluation evidence, not absence of regulation. This likely biases the sample toward jurisdictions with stronger research and publication infrastructures, potentially under-representing lower- and middle-income settings. In addition, recently enacted laws may not yet have generated evaluative publications, creating a time-lag bias.

increasingly reflected in EU governance approaches requiring companies to "identify, prevent, mitigate… and account for negative… environmental impacts" across value chains (European Commission, 2023: 5), signalling a broader shift towards enforceable accountability across the food system.

7.2 Define clear thresholds and measurable standards to drive corporate response

The evidence shows that policies with clearly defined thresholds, such as nutrient limits, marketing restrictions, or product eligibility criteria, consistently generate stronger and more predictable corporate responses than those based on general or aspirational goals. Regulatory frameworks should therefore prioritise:

- explicit, measurable standards (e.g. nutrient thresholds, reformulation targets);
- clear compliance criteria linked to regulatory consequences;
- where possible, portfolio-level targets to prevent narrow optimisation strategies.

This is consistent with a systems-based approach to food governance, which requires coordinated interventions across the food chain rather than isolated or loosely defined measures (European Commission, 2023: 2). Without such precision, policies risk producing minimal or symbolic adjustments rather than substantive change.

7.3 Strengthen enforcement, monitoring, and sanctioning mechanisms

Across all policy areas, the enforcement component of accountability mechanisms is decisive. Policies with weak monitoring systems, limited transparency, or absent sanctions consistently fail to produce meaningful changes in corporate practices. Governments should therefore strengthen:

- independent monitoring systems, including routine data collection on corporate practices;
- mandatory reporting and transparency requirements;

- credible and proportionate sanctions, such as financial penalties or market restrictions;
- long-term health and environmental outcome indicators, embedded as a default component of monitoring and evaluation frameworks.

The last point is particularly important. Evidence from this review consistently shows that corporate compliance with regulatory thresholds does not automatically translate into meaningful public health gains - threshold optimisation, substitution strategies, and portfolio displacement can all technically satisfy regulatory obligations while undermining policy intent. Incorporating outcome indicators alongside compliance measures creates a feedback loop capable of detecting such dynamics and informing iterative policy adjustment over time. Robust data systems are central to this broader effort, as "quality, accessible, timely and reliable [...] data" are essential for tracking progress and ensuring accountability (United Nations, 2015: 12). Without these elements, regulatory frameworks risk functioning as symbolic commitments rather than enforceable constraints.

7.4 Expand accountability frameworks to include sustainability outcomes

The review highlights a critical gap: while many policies address nutritional outcomes, corporate accountability for environmental sustainability and broader food system impacts remains limited or absent. Existing regulatory frameworks rarely impose binding obligations related to emissions, biodiversity, or structural shifts in food systems. Governments should therefore expand accountability frameworks to include environmental performance indicators (e.g. greenhouse gas emissions, land use, biodiversity impacts), as well as, dietary transition targets (e.g. shifts towards lower-impact food products). This reflects the principle that sustainable development is "integrated and indivisible" across dimensions (United Nations, 2015: 1) , and aligns with EU approaches that aim to transform food systems across health, environmental and economic domains simultaneously (European Commission, 2023: 1).

7.5 Move beyond product-level regulation to portfolio and system-level accountability

Even under strong regulatory regimes, corporate responses tend to focus on threshold optimisation - reformulating products just enough to comply without fundamentally shifting overall product portfolios or reliance on ultra-processed foods. This indicates that current regulatory approaches may alter product composition without transforming underlying business models. Governments should therefore complement product-level regulation with:

- portfolio-level targets (e.g. share of healthier or minimally processed products);
- sales-weighted reformulation requirements;
- regulatory approaches addressing overall product mix and market strategies.

A systems-based approach is necessary because food system outcomes are shaped not only by individual products, but by the aggregate structure of supply and consumption (European Commission, 2023: 2).

7.6 Towards a model regulatory accountability framework

Drawing together the findings and recommendations above, the evidence points towards a coherent model of what an effective corporate food accountability framework should look like. Such a framework would combine the following design features:

- **mandatory, statutory basis:** binding legal obligations on manufacturers, retailers, and importers, with no voluntary opt-out;
- **comprehensive nutrient-profiling criteria:** thresholds covering sugar, sodium, saturated fat, and trans fats, aligned with WHO and PAHO benchmarks, applied consistently across product categories;
- **portfolio-level targets:** obligations defined not only at product level but across corporate product mixes, incentivising structural shifts rather than threshold optimisation;

- **broad-scope marketing restrictions:** near-total time-band bans across broadcast and digital media, tied directly to nutrient profile eligibility, modelled on Chile's approach;
- **fiscal reinforcement:** tiered, sugar- and saturated-fat-indexed levies that create unavoidable financial incentives for reformulation, structured to close substitution loopholes iteratively as Hungary's PHPT demonstrated;
- **procurement conditionality:** public and, where feasible, private procurement standards that condition market access on nutritional and sustainability criteria, extending the portfolio-level logic of Brazil's PNAE to commercial supply chains;
- **robust monitoring and outcome evaluation:** independent inspection capacity, mandatory corporate reporting, credible sanctions, and long-term health and environmental outcome indicators embedded as a default within monitoring and evaluation frameworks.

No single jurisdiction reviewed in this study fully combines all of these elements. Chile comes closest in terms of labelling and marketing design; Hungary in fiscal breadth; Brazil in procurement conditionality. The task for policymakers is therefore not to invent new instruments, but to integrate existing best-practice design features into a coherent, mutually reinforcing accountability system.

8. Concluding Remarks

This review examined which regulatory policies hold large food companies accountable for the health and sustainability of the foods they produce and sell, and how these policies shape corporate practices and food environments. Across policy domains, a consistent pattern emerges: corporate behaviour changes where regulatory frameworks impose enforceable obligations with credible monitoring and sanctions, and remains largely unchanged where accountability is absent or weak. These findings challenge the prevailing tendency to frame food policy as a question of instrument selection, identifying the most effective mix of taxes, labels, or marketing restrictions, and instead indicate that instrument choice is secondary to accountability design. Policies are effective not because of their form, but because of the extent to which they establish enforceable actor-forum relationships between food companies and governing authorities.

Where regulatory frameworks rely on voluntary commitments, information disclosure, or weak enforcement, food companies retain substantial discretion to adapt in ways that preserve existing business models, resulting in changes that are partial, symbolic, or narrowly confined. Conversely, where frameworks define clear obligations and impose material consequences, corporate practices shift in more systematic and measurable ways. Critically, however, even the strongest regimes reviewed here operate primarily at the level of individual products and nutrients. Corporate responses consistently reflect threshold optimisation, that is reformulating just enough to comply, rather than fundamental shifts in portfolio composition. This points to a structural ceiling on what product-level accountability alone can achieve.

The central challenge in governing food systems is therefore not the absence of policy tools or empirical evidence, but the limited institutionalisation of accountability within existing regulatory frameworks. Advancing healthy and sustainable food systems requires understanding regulation not as a set of discrete interventions but as the design of accountability systems - systems that establish binding obligations, ensure robust monitoring and transparency, impose consequences that materially affect corporate behaviour, and increasingly address portfolio-level dynamics.

The challenge ahead is twofold. The first is implementation: applying what is already known about effective product-level regulation robustly enough to constrain corporate conduct across jurisdictions. The second is institutional invention: developing the next generation of regulatory instruments capable of holding companies accountable for their portfolio composition as a whole; instruments that, as this review demonstrates, do not yet exist in any jurisdiction in fully articulated form. Designing accountability frameworks that reach beyond individual nutrients to the structure of corporate food portfolios represents the frontier of food systems governance.

9. Annex

Annex 1 Policy Inclusion and Exclusion Criteria

To identify regulatory interventions capable of generating corporate accountability in the food system, this review applied a set of policy-level inclusion criteria prior to the screening of evaluative studies. These criteria were designed to capture regulatory measures that impose legally binding obligations on food industry actors and that plausibly generate observable changes in corporate practices or food environments. Policies were included where they met all of the following conditions:

1. **Temporal scope (post-2005 regulatory wave)**

Only policies adopted after 2005 were included. This temporal threshold reflects the emergence of a new generation of food-environment regulations associated with the global non-communicable disease (NCD) prevention agenda, particularly following the adoption of the WHO Global Strategy on Diet, Physical Activity and Health (Waxman & World Health Assembly, 2004) and subsequent policy frameworks addressing unhealthy food environments. The review therefore focuses on contemporary regulatory instruments developed in response to rising concerns about obesity, diet-related disease, and the role of ultra-processed foods in modern food systems.

Example Exclusion	Albania, 2003-*08 Rregullore për standardet e ushqimit në mjediset e institucioneve arsimore parauniversitare* [Regulation on food standards in the premises of pre-university educational institutions]

2. **Mandatory legal instruments**

Only legally binding regulatory measures were included. Eligible policies therefore consisted of legislation, statutory regulations, ministerial decrees, or enforceable administrative rules adopted by public authorities. Measures were excluded where they relied on: voluntary industry pledges; corporate self-regulation; public-private partnership frameworks; and non-binding policy guidelines or recommendations. Such instruments may influence industry behaviour but do not establish formal

accountability obligations enforceable through law, which is the focus of the analytical framework adopted in this review.

Example Exclusion	Netherlands, 2014 Nationale Aanpak Productverbetering (NAPV) [National Approach to Product Improvement]

3. Regulation of corporate practices in food environments

Policies were required to directly regulate corporate behaviour within food environments. Eligible regulatory domains included: product composition (e.g. reformulation requirements, ingredient restrictions or bans); front-of-pack labelling requirements; marketing restrictions, particularly marketing to children; fiscal measures affecting food pricing (e.g. sugar-sweetened beverage taxes); retail or product placement rules; and public procurement standards affecting the foods supplied in public institutions. Policies focused exclusively on consumer information campaigns, dietary guidelines, or educational interventions without corporate obligations were excluded.

Example Exclusion	Directive (EU) *2018/1808 of the European Parliament and of the Council of 14 November 2018 amending Directive 2010/13/EU on the coordination of certain provisions laid down by law, regulation or administrative action in Member States concerning the provision of audiovisual media services (Audiovisual Media Services Directive) in view of changing market realities*

4. Jurisdictional scope

The initial scoping phase adopted a global search strategy. However, given the volume of eligible cases and the use of a single-reviewer screening and coding process, the geographical scope was refined prior to data extraction to maintain analytical feasibility. Further, sub-national measures (e.g., municipal food taxes or city-level procurement reforms) were also excluded to ensure consistency in governance level. The review therefore focuses on national-level regulations, with the final analytical sample limited to countries in the WHO European Region and

Latin America, which include several widely recognised regulatory "best practice" cases (Crosbie et al., 2022).

Example Exclusion	Canada, *1980 (2012) Quebec's Consumer Protection Act (QCPA)*

5. Corporate accountability relevance

Policies were required to create observable obligations for firms, including restrictions, disclosure requirements, financial disincentives, or other regulatory mechanisms capable of altering corporate product portfolios, marketing strategies, or retail practices. This criterion ensures that the policies analysed correspond to the conceptual definition of accountability adopted in the study, which focuses on legal obligations and observable behavioural change by regulated actors (Bovens, 2007).

Example Exclusion	Bulgaria, *2005-2010 Храни и хранене* [National Nutrition Action Plan]

6. Evidence availability and source eligibility

For a policy to be included in the analytical sample, relevant evaluative information had to be identifiable through the predefined search sources used in this review. These included academic databases (Scopus, PubMed, and Google Scholar), as well as targeted searches of grey literature such as policy reports, institutional publications, and evaluation documents produced by international organisations, governments, or research institutes. Policies were excluded where no evaluative evidence could be located through these sources, even when the regulation itself could be identified through policy mapping.

Example Exclusion	Belgium, *2009 (2016) Loi relative au régime d'accise des boissons non alcoolisées et du café* [Law of 21 December 2009 concerning the excise duty regime for non-alcoholic beverages and coffee]

[21]Annex 2 Coding Manual

A1. Policy category

- Labelling (mandatory disclosure or warning) | Marketing restriction | Fiscal measure (tax/ levy) | Reformulation standard (mandatory nutrient thresholds) | Public procurement standard | Retail/placement rule | Composite / multi-component | Other

Clarification: Code the dominant regulatory lever shaping corporate conduct.

A2. Regulatory object

- Product composition (nutrient thresholds, ingredient limits) | Information provision (labels, disclosures) | Marketing exposure (who/ when/ how products can be promoted) | Pricing (tax pass-through, levy design) | Placement/ availability (retail positioning, school bans) | Procurement eligibility (supply-side restrictions) | Portfolio-level targets (e.g., % healthier products) | Multiple

A3. Binding obligation

- Mandatory (statutory) | Hybrid (mandatory core + voluntary components) | Voluntary | Unclear

Clarification: Exclude purely voluntary & unclear schemes from inclusion, but code hybrid cases.

A4. Level

- EU-level regulation | National law | Subnational (regional/ municipal) | International soft law

Clarification: Exclude international, regional & local regulatory codes.

A5. Targeted corporate actors

- Manufacturers / Brand owners | Retailers | Food-service / Catering | Importers | Multi-actor supply chain

[21] This coding framework does not claim to measure "true" healthiness or sustainability of foods. Rather, it systematically captures whether regulatory accountability mechanisms compel corporate practice changes that move food environments in directions consistently recognised by WHO, EAT-Lancet, and related frameworks as healthier and lower-impact, while explicitly documenting uncertainty, substitution effects, and trade-offs.

A6. Specific firm-size differentiation (Yes/ No)

- Yes = any legally codified differentiation.
- No = uniform obligations across firms.

Clarification: Code whether the regulation differentiates obligations by firm size (e.g., SME exemptions, delayed implementation for small firms).

A7. Forum type

- Administrative (regulator/ inspectorate) | Legal (courts/ tribunals) | Political (parliament/ ministerial oversight) | Social (public disclosure enabling NGO/ media scrutiny) | Multiple

Clarification: Code the primary institutional arena to which firms are accountable. This review focuses specifically on institutionalised legal and administrative accountability embedded in statutory regulatory frameworks.

A8. Forum institution

Clarification: Specify the full name of the responsible institution(s) that exercise monitoring, judgement, or sanctioning authority (e.g., Ministry of Health, Food Standards Agency, Competition Authority). If enforcement is multi-level, list all relevant institutions.

A9. Obligations specified

Clarification: Describe the concrete legal duties imposed on firms (e.g., product-level nutrient thresholds, mandatory warning label design specifications, marketing bans, sales prohibitions, reformulation deadlines, reporting duties). Code clarity and precision descriptively (e.g., “clear numeric thresholds per 100g”, “process-based obligation”, “performance target”).

A10. Monitoring capacity

- Routine inspections | Product-level audits | Mandatory reporting datasets | Public transparency mechanisms | Complaint mechanisms | None reported

A11. Enforcement tools

- Fines | Product withdrawal | Delisting (procurement or retail) | Advertising ban | Legal liability | Reputational sanction institutionalised | None reported

- A12. Credibility of consequences
- High | Moderate | Low | Unclear

Clarification: Code based on regulatory design.

A13. Corporate practice change targeted

Clarification: Specify the behavioural change the regulation intends to induce (e.g., reformulation, product withdrawal, portfolio restructuring, marketing reduction, sales displacement). Code based on regulatory design.

A14. Observed corporate practice change

Clarification: Document empirically observed corporate responses (e.g., reformulation, substitution with non-nutritive sweeteners, portfolio shift, product disappearance, strategic compliance, marketing adaptation). If effects cannot be disentangled from consumer response, note explicitly.

A15. Notes

B1a. Nutrients assessed

- Sugars | Salt/ sodium | Saturated fat | Trans fat | Total fat | Energy (kcal) | Fibre/ fruit & veg | Other

Clarification: Code all nutrients or dietary components evaluated in empirical studies.

B1b. Direction of nutrient change

- Positive | Null | Mixed | Negative
  - Positive = reduction in nutrients of concern or increase in beneficial components.
  - Null = no documented changes.
  - Mixed = improvements offset by increases elsewhere.
  - Negative = deterioration in nutrient profile.

B1c. Magnitude of change

- Large | Moderate | Small | Not reported

Clarification: Use study authors' interpretation where possible.

B2a. Processing classification used

- NOVA (FAO) | Study-defined | Not classified

B2b. Ultra-processed food (UPF) outcome[22]

- ↓ UPF share (products) | ↓ UPF share (sales/ purchases) | ↓ UPF exposure/ availability | No change | ↑ UPF

B2c. Food group shifts

- ↑ / ↓ fruit & veg | ↑ / ↓ legumes & nuts | ↑ / ↓ whole grains | ↑ / ↓ discretionary foods | ↑ / ↓ animal products | ↑ / ↓ processed meat | No shift reported

Clarification: Code supply-side changes in corporate portfolios. Do not code consumer intention unless linked to supply adjustments.

B3. Overall health alignment

- High | Medium | Low/ None | Unclear
    - High = clear movement toward WHO benchmarks (e.g., sugar reduction directionally toward <10% energy; salt reduction; UPF reduction; increased plant foods).
    - Medium = partial, category-limited, or mixed improvements.
    - Low/ None = null effects, substitution/rebound offsets, or deterioration.
    - Unclear = insufficient evidence.

B4. Notes

C1. Sustainability indicators reported

[22] Studies differed substantially in how ultra-processed food (UPF) outcomes were defined and reported. Many evaluations did not specify the precise indicators used to assess changes in processing levels (e.g., product reformulation characteristics, presence of cosmetic additives such as flavourings or emulsifiers). Where studies reported general changes in UPF presence, such as increases or decreases in UPF products, sales, purchases, or exposure, these outcomes were coded according to the direction of change reported by the study, without distinguishing between specific indicators. This approach enabled consistent synthesis across heterogeneous evidence but limits the ability to differentiate between distinct dimensions of UPF change (e.g., reformulation). The limitation reflects the level of detail reported in the primary studies rather than the analytical framework applied in this review.

- GHG emissions | Land use | Water use | Biodiversity | Composite score | None reported

C2a. Protein/source shifts

- ↑ / ↓ plant-based foods | ↑ / ↓ animal products | ↑ / ↓ alternative proteins (plant/ fungal/ microbial/ cultivated/ insect) | Multiple | No shift reported

Clarification: Code supply-side changes in corporate portfolios. Do not code consumer intention unless linked to supply adjustments.

C2b. Other sustainability-relevant changes

- Shift away from high-impact foods | Sustainable sourcing (diet-linked) | None reported

C3. Overall sustainability alignment

- High | Medium | Low/ None | Unclear
    - High = plant-forward shift and/or ≥2 environmental indicators improve.
    - Medium = one proxy improves or limited scope.
    - Low/ None = no change, rebound effects, higher-impact substitution.
    - Unclear = insufficient evidence.

C4. Notes

D1. Health-sustainability relationship

- Health ↑ / Sustain ↓ | Sustain ↑ / Health ↓ | Both ↑ | Neither ↑ | Not assessable

D2. Explanation

E1. Compliance reported

Clarification: Document reported compliance rates and their trajectory over time.

E2. Enforcement activity

Clarification: Document inspections, audits, legal actions, or other sanctioning events.

E4. Industry response

Clarification: Document strategic responses (e.g., reformulation, lobbying, delay tactics, product repositioning).

E5. Fidelity

Implemented as designed | Phased/ Delayed | Weakened via amendment | Strengthened via amendment | Partial enforcement

Clarification: Code deviations between legislative intent and real-world execution.

E6. Notes

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