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The drivers of food supply chain, dietary patterns and food choices, and sustainability in the food system

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Executive Summary

This report examines the role played by agricultural, environmental, trade and consumer policies in relation to nutrition as well as how policy instruments can support or hinder the achievement of public health goals involving healthy and sustainable food systems. The current dietary patterns contribute to rising rates of non-communicable diseases, while the agricultural sector contributes substantially to greenhouse gas emissions, biodiversity loss, water pollution, and soil degradation. The EU faces growing challenges as its food system places significant pressure on planetary health. Unsustainable diets and food systems contribute significantly to the degradation of these systems. Sustainable food systems must be economically viable, ecologically responsible, nutritionally adequate, socially equitable, and culturally acceptable. We can nourish a growing population while regenerating the planet's ecosystems by transforming how we produce, consume, and value food. Healthy diets for all can only be delivered if they are sustainable, and if their accessibility and affordability are an integral part of how food systems function. Food systems and the planet's natural resources are intricately linked. A key principle is to ensure that both food systems and natural resources are nurtured in ways that support sustainable and healthy diets. Food systems must support both human and planetary health, and actions to protect natural resources and mitigate climate change must also support the goals of healthy and sustainable food systems.

Dietary patterns, drivers of dietary choice, and sustainability of food system practices must emphasise on ***transitioning food systems from feeding people cheaply to nourishing people sustainably***. Addressing the policy distortions will only be possible if decision makers show leadership to steer the policy changes, but governments have been passive in reforming food systems and influencing the drivers of dietary choice due to competing priorities. The EU Common Agricultural Policy (CAP) has shaped the broader food environment in which European consumers make dietary choices. Through subsidies favouring the production of cereals, dairy, and livestock, the early CAP contributed to a food system that prioritised calorie-dense and nutrient-poor products over fruits, vegetables, and legumes. This influenced the availability, affordability, and acceptability of different food categories, often to the detriment of healthy dietary patterns. The CAP has played a role in the structural alignment of agricultural production and public health. However, equally or more important is the influence of food processing, retail, and consumption practices, which determine how agricultural outputs are integrated into diets. Research should identify the drivers and different incentives faced by the food supply chain to produce the products they do along with the sources of incentives most responsive to leveraging the supply chain towards healthier eating. The food supply chain should be the focus of analysis and intervention rather than agricultural production or the farm-holding. There are many points to intervene at the ***food supply chain to include "health in all policies" for food system transformation***.

The rise of cheap, energy-dense, hyper-palatable ultra-processed foods (UPFs) high in added sugars, fats, and salt is both a symptom and a cause of modern food system failures. While they have reduced food costs and increased convenience, they have done so at the expense of public health, nutrition equity, and sustainability. Addressing this issue requires systemic changes—not just individual dietary choices. Systemic changes must be multi-level, targeting the economic, regulatory, agricultural, and social systems that shape our food environment to address the prevalence of cheap and low-nutrient calories via the dominance of UPFs. Addressing the systemic dominance of unhealthy UPFs requires coordinated, long-term policy and cultural change, including rethinking what we grow, how we process and distribute food, and how people access and understand food as well as who controls the food system. Ultimately, ***we need to rebuild food systems that are nutritious, equitable, and sustainable centred not just on profits and economic growth but also on people***.

1. Introduction

Cancer and other non-communicable diseases (NCDs) make up more than two-thirds of the burden of disease in Europe. At the population level, substantial variations exist according to socio-economic status, geographical area, age, disability, gender, and ethnic groups. A large part of this disease burden is preventable. The overall aim of JA PreventNCD is to reduce the burden of cancer and other NCDs and common risk factors, both at a personal and societal level, and support member countries by taking a holistic approach for the prevention of cancer and other NCDs, through coordinated action.

Health in All Policies (HiAP) is an approach to public policies that systematically considers the health, health equity and health systems impact of policies across sectors and seeks synergies to improve population health and health equity. Using a HiAP approach aims to address policies such as those influencing the environment, agriculture, finance, taxation education, and economic development for promoting overall health and health equity. HiAP recognizes that population health is not merely a product of health sector programmes, but also policies that guide actions beyond the health sector. Policies in every sector of the economy can potentially affect inequities in health as well as overall health at the population or individual level. Health is shaped by social determinants such as where people live, work, and have leisure activities. By embedding health considerations into all areas of policy, HiAP helps to prevent disease rather than just treat it, save healthcare costs over time due to prevention, and promote social justice and equity.

The key principles of HiAP are i) *intersectoral collaboration*: Encouraging cooperation among different sectors of government, businesses, and society; ii) *participation*: engaging communities and relevant actors and stakeholders in the policymaking process; iii) *accountability*: ensuring policies are transparent and include mechanisms for monitoring health impacts; iv) *sustainability*: promoting long-term, preventative approaches to health; v) *health equity*: prioritizing the reduction of health disparities and ensuring that policy benefits are distributed fairly (Leppo et al., 2013).

The HiAP approach is highly relevant when examining the issue of unhealthy ultra-processed foods (UPFs). The HiAP approach systematically takes health implications into account across all sectors—not just health care, but also agriculture, trade, food processing, retail, education, finance, and other relevant sectors. HiAP advocates integrating health concerns into all policy domains to address the root causes of unhealthy diets because food environments are shaped by policies beyond health. UPFs are widely available, heavily marketed, and often cheaper than nutritious whole foods. According to Baker et al. (2020) and Hawkes (2006), these conditions are shaped by non-health policies, for example, agricultural subsidies for commodity crops (e.g., corn, soybean, wheat) as cheap ingredients for UPFs along with the industrialisation of food systems, technological change, and globalisation via trade agreements that favour transnational food corporations. Consequently, understanding the drivers and dynamics of UPFs consumption is essential, given the evidence linking these foods with adverse health outcomes such as cancer and other NCDs.

The current dietary patterns contribute to rising rates of NCDs, while the agricultural sector contributes substantially to greenhouse gas (GHG) emissions, biodiversity loss, water pollution, and soil degradation. The European Union (EU) faces growing challenges as its food system places significant pressure on planetary health. Planetary health recognises that human health is intimately linked to the state of the natural systems that sustain life — including climate, biodiversity, air, water, and soil. Unsustainable diets and food systems contribute significantly to the degradation of these systems. Therefore, healthy and sustainable diets proposed by the EAT-Lancet Commission (Willett et al., 2019) and Nordic

Nutrition Recommendations (Blomhoff et al., 2023) have the potential to shift and change food consumption patterns for improving human health and planetary well-being.

Kenney and Poole (2025) pointed out that despite growing recognition of how food environments shape our eating behaviour, existing policy interventions to change them remain insufficient because eating is so central to survival, whereby humans are hardwired to love food and impulsively seek it out, especially salty, sugary, fatty, energy-dense foods such as UPFs that activate feelings of pleasure in our brains. Therefore, revolutionary changes to our diet quality for preventing cancer and other NCDs require a more multidimensional approach that targets the features our food environment along with necessary changes to the food supply chain. Food systems are uniquely placed to provide an extraordinary opportunity to enhance human wellbeing as well as contributing to Earth-system stability by building the resilience of health and environmental systems together with economic and social systems (Rockström et al., 2025).

2. Methodology

The Conceptual Framework at the EU level (see Figure 1) will serve as the base and structure for policy analysis. Current and previous agricultural, environmental, trade and consumer policies are analysed along with public policies consisting of laws, regulations, guidelines, and programs that governments have created and/or enacted to solve health problems and other issues (e.g., agricultural, environmental, trade, consumer, etc.). Economic policies concerning agriculture, trade, investment, and marketing affect what we eat, therefore policy makers should pay attention to both food and health policies to address the structural causes of diet-related NCDs, especially among groups of low socioeconomic status (Hawkes, 2006).

To assess the alignment of EU policy instruments with health-centric nutritional objectives, the 2023 Nordic Nutrition Recommendations (NNR) are used to determine the list of specific food groups: *red and processed meat*, *sweets/confectionaries, fruits and vegetables, and whole grains*. The NNR has been instrumental in guiding the development of national dietary guidelines in the Nordic countries for more than 40 years and are also applied by the Baltic countries (Blomhoff et al., 2023). NNR offers scientifically robust, evidence-based guidance that intertwines nutritional health and environmental considerations and is therefore used as a benchmark for assessing policies. The NNR are formulated with considerations of dietary patterns and public health challenges that share similarity with those of the overall EU population. The clear and actionable food-based guidelines by the NNR provide a practical yardstick for EU policy evaluation. The comprehensive scope, methodological rigor and use of high-quality systematic reviews, and relevance to both dietary patterns and disease prevalence within the EU further justifies employing the NNR recommendations on these food groups.

The science-based advice of NNR 2023 can be summarized as a “predominately plant-based diet” (Blomhoff et al., 2023). More specifically, this implies an increased intake of non-starchy vegetables, fruits, berries, pulses, whole grains, nuts and seeds, and fish, and a lower intake of red and processed meat, processed foods high in added fats, salt and sugar, and alcohol. There is strong evidence that such a dietary pattern is associated with lower mortality as well as reduced risk of NCDs, e.g., cardiovascular disease, cancer, obesity and type 2 diabetes (Blomhoff et al., 2023). For sustainability reasons, reducing the climate footprint of diets can generate side benefits in terms of nutrition and affordability, which confirms that dietary change should be central to the sustainability transition of the food system. Although, more attention should be paid to the issues of taste, convenience, social norms, and other aspects

determining the cultural acceptability of sustainable diets (Irz et al., 2024). The food groups are selected on the basis of health effects and strength of evidence in their significance for public health, as identified by the Global Burden of Disease (GBD) study (GBD Risk Factors Collaborators, 2024). The rationale for the specific food groups is elaborated upon below:

Red meat and processed meat. A high intake of red and processed meat (i.e. meat preserved by smoking, curing, salting, or addition of preservatives) have been linked to increased risk of colorectal cancer as well as cardiovascular disease and type 2 diabetes (Blomhoff et al., 2023). Processed meat is also classified as carcinogenic for humans by the International Agency for Research on Cancer. High consumption of red and processed meat is also identified by the GBD study as another top dietary risk factor for Disability-Adjusted Life Years (DALYs) and deaths due to NCDs in the EU.

Sweets/confectioneries. Sweets, such as chocolate or other confectioneries, including sugar-sweetened beverages, are probably causally related to increased risk of obesity and dyslipidaemia, type 2 diabetes, and cardiovascular disease (Blomhoff et al., 2023). Furthermore, high-sugary, energy-dense foods have a negative effect on the overall dietary quality.

Fruits and vegetables. A diet rich in fruits and vegetables (including berries) is widely recognized for its protective role against a range of NCDs, including coronary heart disease, stroke, type 2 diabetes, and cancer. According to NNR 2023, there is strong evidence for a reduced risk of cardiovascular diseases, several types of cancer, and all-cause mortality with higher intakes of fruits and vegetables (Blomhoff et al., 2023). The GBD study highlights the low consumption of fruits and vegetables as a leading dietary risk factor for disease burden (DALYs: Disability-Adjusted Life Years) and deaths in the EU region.

Whole grains. The NNR recommends a daily intake of at least 90 grams of whole grain cereals, in part due to “convincing” associations with lower risk of all-cause mortality, coronary heart disease, colorectal cancer, and type 2 diabetes (Blomhoff et al., 2023). In terms of burden of disease impact, a diet low in whole grains is the highest-ranked dietary risk factor in the EU countries.

The selected food groups are relevant from a policy standpoint in the EU context. According to the Conceptual Framework at the EU level (see Figure 1), agricultural policies such as the EU Common Agricultural Policy (CAP) can have a significant impact on the production and availability of food groups such as grains, meats, fruits, and vegetables. Environmental policies are crucial in reducing the impacts of these food products on the ecosystems and climate. Trade policies and agreements influence the imports and exports of these food groups, affecting price and availability. Sweets/confectionaries are pivotal in assessing policies related to nutrition labelling, advertising, and taxes as well as the legislation in protecting consumer rights (e.g., Unfair Commercial Practices Directive). By understanding how such policies align or diverge from the recommendations targeting the aforementioned food groups, we may elucidate areas where policy reform is necessary. Tobacco control via illustration with a case study is to understand why it is essential to implement evidence-based policies to prevent and reduce the harm caused by tobacco use and trade on public health and sustainability as well as support the adoption of forward-looking tobacco control measures.

*** SDG Target 3.4:**
By 2030, reduce by one third premature mortality from non-communicable diseases through prevention and treatment and promote mental health and well-being.

**** SDG Target 3.A:**
Strengthen the implementation of the World Health Organization Framework Convention on Tobacco Control (WHO FCTC) in all countries, as appropriate.

***** Unfair Commercial Practices (UCP) Directive:**
Overarching EU legislation regulating unfair commercial practices that occur before, during and after a business-to-consumer transaction has taken place, including untruthful information to consumers or aggressive marketing techniques to influence their choices.

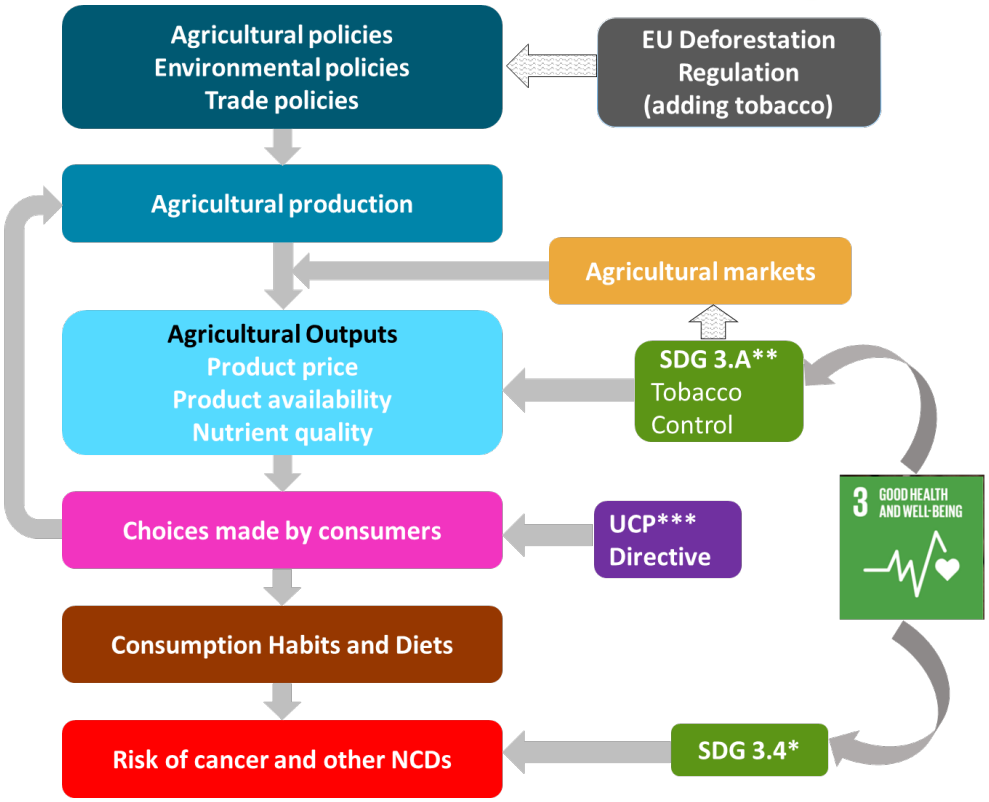

Figure 1. Conceptual Framework at the EU level (adapted from Hawkes, 2007).

3. Agricultural Policies and Subsidies

This chapter examines the role of the EU Common Agricultural Policy (CAP) in shaping European food production, consumption, and diets, particularly through pricing and subsidies, but also through CAP's wider impact on the structure and priorities of agricultural production. This chapter considers how these effects interact with post-farmgate dynamics—such as food processing, retail, and marketing—to create food environments that may have an impact on public health and NCDs.

Policies affecting agri-food markets

The CAP has been one of the most influential and longstanding policy frameworks within the EU. Introduced in 1962, its original mandate was to ensure food security, stabilise markets, increase agricultural productivity, and support farmers' livelihoods in the aftermath of World War II. Over time, the CAP has evolved to incorporate broader objectives, including environmental sustainability, rural development, and climate resilience. It is based on three major principles:

- A unified market in which there is a free flow of agricultural commodities with common prices within the EU;
- Product preference in the internal market over foreign imports through common customs tariffs; and
- Financial solidarity through common financing of agricultural programs.

Supporting and protecting agricultural producers in the EU has historically been the main purpose of the CAP. While the CAP does not directly address nutrition or health outcomes, it profoundly shapes the European food system by determining how much support each commodity receive, and how markets are regulated. These upstream decisions then influence what types of raw materials are available and affordable for domestic food processors.

The CAP has historically allocated substantial subsidies to a narrow range of commodities—primarily cereals, dairy, beef, and sugar. These products have received both direct payments and border protection through tariffs and import quotas (OECD, 2011). While CAP subsidies reduce costs of domestic production, tariffs on imported agricultural and food products often raise consumer prices above world market levels. In many cases, the protective effect of tariffs outweighs the cost-reducing effect of subsidies, resulting in higher prices for EU consumers than would have been in the absence of these policies.

In contrast, fruits, vegetables, legumes, and nuts have received relatively limited support. Furthermore, border protection (i.e. tariffs and quotas) has been generally lower for fruits, vegetables, legumes, and nuts compared to cereals and livestock products such as beef and dairy, so the trade policy measures in the CAP have favoured fruits, vegetables, legumes, and nuts at the consumer price level. On the other hand, their limited support under CAP means that domestic production has not been incentivised to the same degree as cereals and livestock products. This might have affected regional supplies that lead to import dependence on certain products such as tomatoes, citrus fruits, grapes, and berries, especially outside of the peak seasons.

The influence of CAP on agri-food markets has not remained static over the years. In the 1960s and 1970s, CAP emphasis on increasing food production contributed to significant improvements in food availability and affordability, helping to eliminate food insecurity across much of Europe. During this phase, high levels of support for staple commodities helped stabilise prices and increase caloric intake, aligning with the post-war recovery needs. However, as the EU transitioned to a period of relative food abundance, the continuation of these support mechanisms began to have unintended effects. Surpluses in dairy, meat, and cereals coincided with a food industry increasingly geared toward convenience, shelf-stable, and ultra processed products.

The impact of policies on consumers' food spending in the EU

The impact of CAP at the farm level on consumers' food spending

A key element in understanding how CAP shapes food environments lies in the economic structure of food pricing. In order to measure the impacts of CAP on the EU agri-food markets across a variety of different instruments and across different food products, there is a need to aggregate different measures up to a uniform unit of measurement that is comparable and consistent over time and across different products. Therefore, we utilize the Producer Support Estimate (PSE) and Consumer Support Estimate (CSE) developed by the Organisation for Economic Co-operation and Development (OECD 2016). The PSE measures the value of the monetary transfers from taxpayers and consumers to producers of agricultural products, arising from policy measures that support agriculture (e.g., tariffs and subsidies) at the farm gate level. The CSE tells us how much more (or less) consumers are paying for food as a result of the policy measures compared to buying at world market prices. In other words, CSE includes all elements of taxation and support to food consumption at the primary product level,

and therefore represents a comprehensive and consistent measure to gauge the impacts of policies on food prices, which influence the choices made by consumers that finally affect their diets and health (Schmidhuber and Shetty 2010).

Applying this definition, the OECD calculates that, as a result of different policy measures, EU consumers were taxed annually on average of 2021-2023 by around €15.7 billion or 3.5% of the total value of consumption at farm gate level (Table 1). The €15.7 billion net tax is mainly the result of a €16.2 billion higher consumer price level, which is slightly reduced by about €0.5 billion in consumption subsidies. The €16.2 billion higher consumer price level is mainly explained by the fact that EU prices are kept above world market prices through border protection measures (tariffs and import quotas). Domestic taxes (not including VAT) on food prices in the EU were more than €0.6 billion in 2021-2023. Table 1 also shows that the net tax paid by EU consumers due to policy measures has decreased over time. At the beginning of the millennium in 2001-2003, the net tax because of policy measures reached €36 billion or 14.4% of the total value of consumption at farm gate level (OECD 2024).

Table 1. The estimated impact of policy measures on consumers' annual food spending in the EU during 2001-2003, 2011-2013, and 2021-2023 (€ million)

	2001-2003	2011-2013	2021-2023
Transfers from consumers to producers due to higher prices than world prices (import protection)	39 464	15 053	15 520
Other transfers from consumers (i.e. excise duties)	891	137	648
Transfers from taxpayers to consumers (consumption subsidies)	-4 187	-1 063	-478
NET EFFECT OF POLICIES ON FOOD PRICES	**36 168**	**14 128**	**15 690**
Total value of food consumption (at farm gate)	250 659	376 018	450 776
%-change in prices at farm gate level due to policies	+14,4%	+3,8%	+3,5%

The overall net tax of €15.7 billion annually on EU consumers from the average of 2021-2023 hides important commodity-specific differences and their evolution over time. Figure 2 shows the impacts of various CAP reforms in the past decades. In 2021-2023, beef and poultry meat together accounted for almost 70% (€10.9 billion) of the total taxation on consumer price (€15.7 billion). This means that EU consumers paid €10.9 billion more for beef and poultry meat products than they would have paid in the absence of the policies. The impact of policy measures on product prices has changed quite significantly for certain commodities over time. At the beginning of the millennium in 2001-2003, beef alone accounted for more than 50% of the total taxation on consumer price, however, the net tax on beef was reduced to less than 20% in 2021-2023 due to agricultural policy reforms. In case of sugar, EU consumers were taxed at over 50% compared to the world market price of sugar in the early 2000s, but with the liberalisation of the EU sugar regime, the net tax has then fallen to just over 5% (see Figure 2).

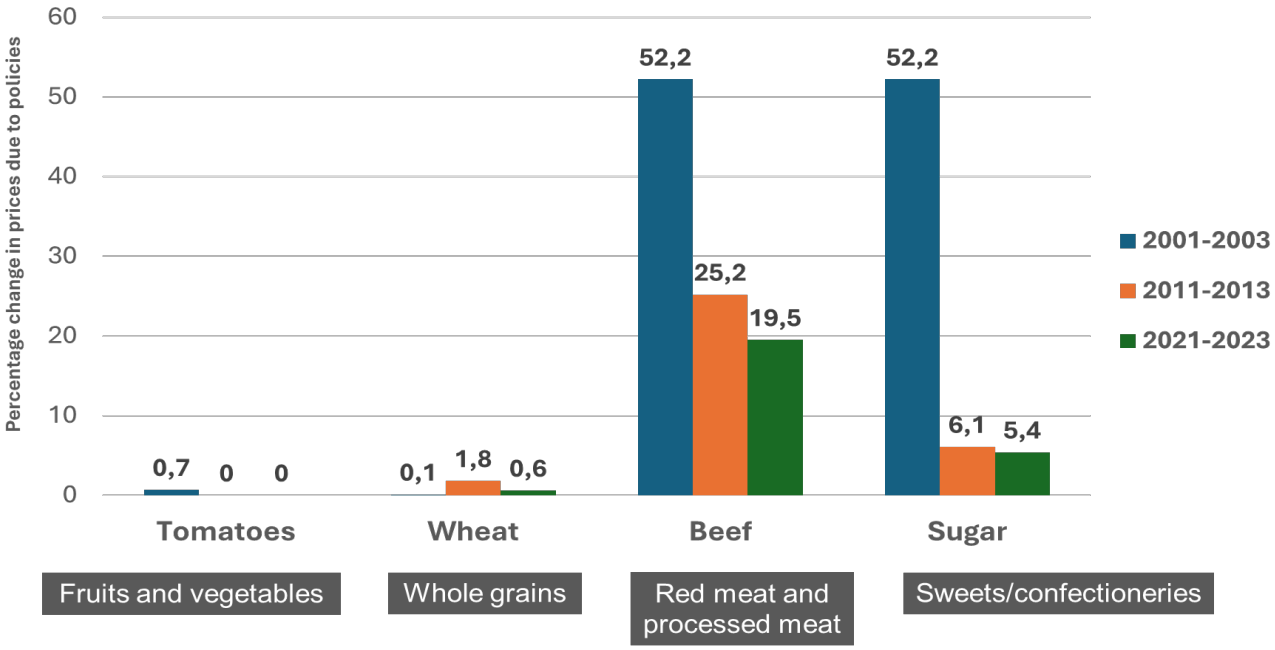

Figure 2. Impact of policies and commodity-specific differences at the farm gate prices.

The impact of CAP at the retail level on consumers' food spending

Earlier, we have examined how much the CAP affects food prices at the farm gate level. We now extend our analysis to the impact of the CAP on retail food prices and consumer food spending. Households in the EU spent on 'Food and alcoholic beverages' annually €1,163 billion on average of 2021-23. Because of different policy measures, EU food consumption was taxed annually by around €15.7 billion on average of 2021-2023, which means a tax of 1.3% of the total value of household food & alcoholic beverages consumption. Therefore, CAP (including production and consumption subsidies plus trade policies) do not offer an effective way of changing food consumption patterns (see Figure 3).

Consequently, what happens after the farm gate level has a more direct influence on what consumers ultimately eat. The share of agricultural raw materials in the final consumer price of food is typically quite low (Baltussen et al., 2019; OFPM, 2025; Peltoniemi and Niemi, 2016; USDA, 2025):

- For highly processed foods (e.g., packaged snacks, soft drinks), the farm share is often below 10%.
- For semi-processed items (e.g., bread, yogurt), the farm share may be around 15–25%.
- For unprocessed or minimally processed foods (e.g., fresh fruits, vegetables, raw meat), the farm share may range from 20% to 40%.

The remaining shares reflect the costs associated with processing, packaging, logistics, advertising, and retail margins. Therefore, more important drivers for changes in consumption patterns and excess consumption are likely to be found in the role of food industry in transforming raw agricultural products into processed foods, changes in food distribution systems, the rise of supermarkets, the growing importance of food consumed outside home, including in fast food restaurants, and the overall increase in income.

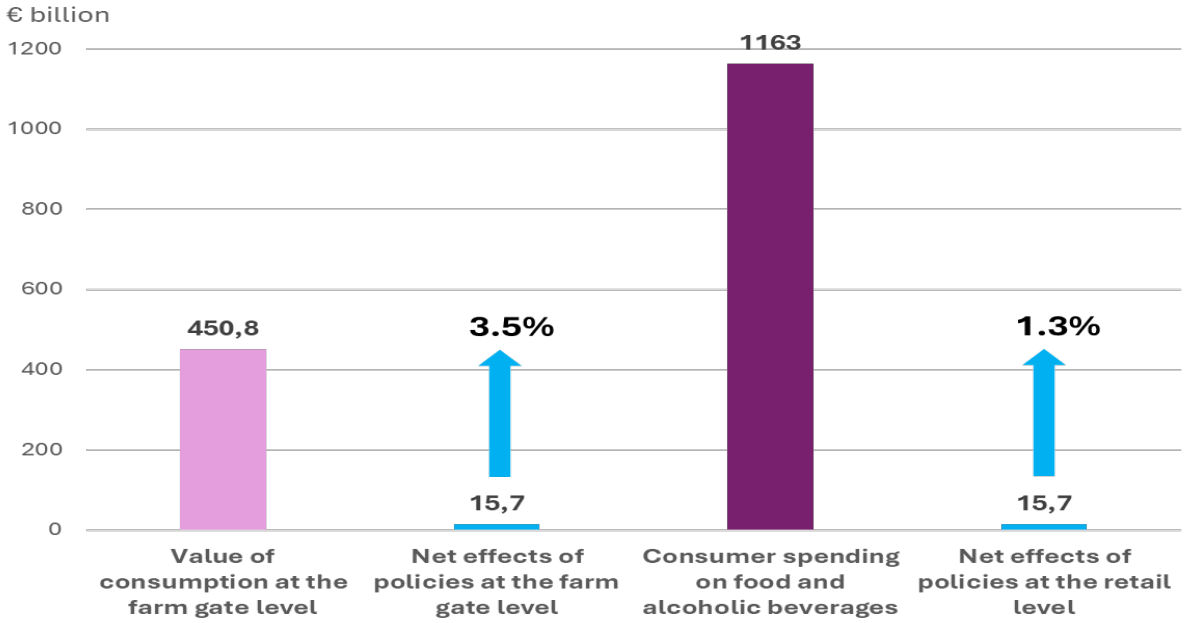

Figure 3. Net effects of policies on average of 2021-23 at the farm gate level and at the retail level.

The impact of CAP on processing and retailing

The processing and retail sectors play a critical role in shaping the final food environment. They also play a significant role in the total value added in the food chain, surpassing that of the primary production sector (see Figure 4). The food processing industry adds value by transforming raw agricultural products into consumer-ready foods (e.g., turning wheat into bread, raw milk into cheese), and thus, contributes to a significant share of the total value added due the transformation processes. The retail sector extracts significant value due to control over pricing, shelf space, and consumer access, and adding value through logistics, customer service, product presentation, and marketing.

The food processing industry in the EU has been partly shaped by the evolution of the CAP, which primarily focuses on agriculture and rural development. From securing raw material supply and promoting industrial expansion to fostering product quality and local innovation, the CAP has influenced many aspects of food processing. The food retail sector in the EU has not been a direct target of the CAP. However, the evolution of the CAP has indirectly shaped the structure and dynamics of food retail by influencing what products are produced and available, and how food is sourced and priced.

One of the most fundamental impacts of CAP on the food processing industry has been the consistent and abundant supply of agricultural raw materials. By incentivising agricultural production through price supports, market interventions, and direct payments, CAP helped create a stable supply of key inputs such as cereals, dairy products, sugar beet, and oilseeds (Ritson and Harvey,1997; OECD, 2005). This reliability in raw material availability enabled food processors to plan long-term investments, optimise supply chains, and reduce exposure to input price volatility. For sectors such as dairy processing, meat packing, and cereal milling, CAP's role in stabilising input flows was also essential to scaling operations (European Commission, 2012; Tracy 1997).

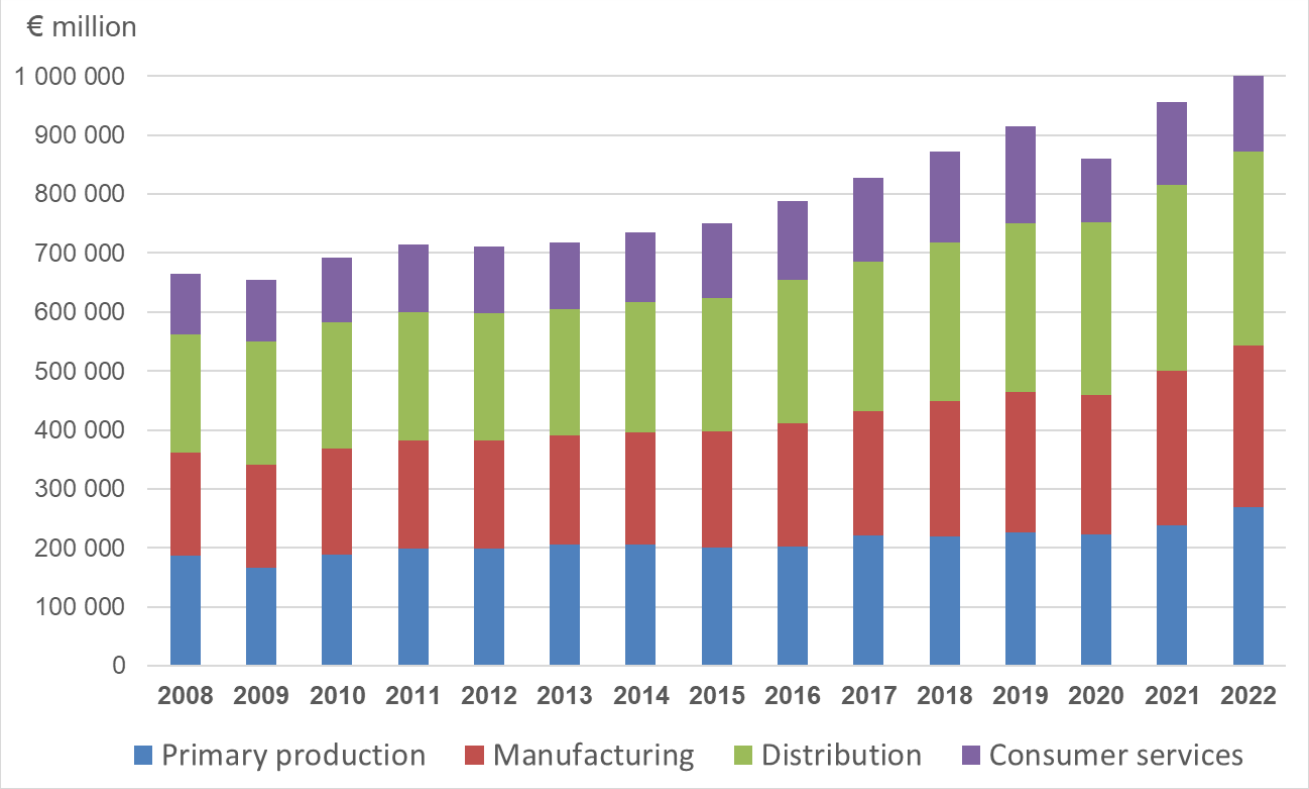

Figure 4. Breakdown of the total value added in the EU food chain on average between 2008-2022 (Source: European Commission, 2024).

The downstream actors have tended to favour ingredients that are cheap, storable, and suitable for large-scale processing—attributes that align well with subsidised commodities like cereals, dairy, and meat. Processing practices prioritise shelf life, cost reduction, and consumer appeal—often at the expense of nutritional quality. Meanwhile, large-scale retailers influence consumer access through pricing strategies, product placement, and promotion. As a result, the food system has started to lean toward the mass production and consumption of energy-dense, processed foods due to consumption patterns, and the incentives and structures embedded in processing and retail. Especially the overproduction trends driven by the early CAP mechanisms during the 1970s and 1980s—often resulting in surpluses of butter, milk powder, and grains—benefited the food processing industry by providing inexpensive inputs (Tangermann, 2011). As a result, industrial food processing expanded significantly, especially for products such as cheese, baked goods, confectionery, and processed meats. These conditions favoured the growth of large-scale, standardised processing operations capable of transforming surplus raw materials into shelf-stable, exportable, or mass-consumed goods. Over time, this dynamic contributed to vertical integration in the agri-food chain, with processing companies establishing tighter control over supply chains, often through contracts or direct ownership. This evolution increased efficiency but also raised barriers to entry for smaller, independent processors and reduced supply diversity (Matthews, 2016).

Since the 1990s, CAP reforms have emphasised more on food quality, environmental sustainability, and rural development. The 1992 MacSharry reforms marked a turning point in the CAP by reducing price supports and introducing direct payments to farmers (OECD, 2011). These reforms aimed to make EU agriculture more competitive and responsive to global markets. Increased market orientation also required food processors to respond to market

signals rather than rely on protected prices via tariffs and import quotas. There was a greater pressure to improve efficiency and competitiveness, which led to rise in contract farming and closer farmer-processor integration to ensure quality and traceability.

This shift had also implications for retailers. As commodity prices became more volatile, retailers placed greater pressure on processors and producers to maintain low prices, leading to more centralised procurement and the growth of private labels (Wijnands et al., 2008). Retailers increasingly took on the role of quality gatekeepers, enforcing stricter standards on suppliers. The rise of contractual relationships and just-in-time delivery systems reflected a more integrated and efficient food supply chain shaped by the changes in CAP and market liberalisation.

The introduction of quality schemes, such as Protected Designation of Origin (PDO) and Protected Geographical Indication (PGI), created opportunities for processors to add value through regional branding (Barjolle and Sylvander, 2002). Additionally, support for organic farming and traceability requirements under CAP have encouraged processors to innovate in labelling, product integrity, and premium segment targeting. These developments helped diversify the industry beyond basic commodity processing, fostering niche markets for high-quality, origin-linked foods. CAP-supported labelling schemes empowered consumers to make more informed choices and enabled retailers to differentiate products based on origin, authenticity, and production method (European Commission, 2020). Retailers adopted these schemes enthusiastically. Supermarkets introduced special sections for local and certified products, promoted organic ranges, and used CAP-backed designations to build consumer trust. Traceability requirements introduced in response to food safety scandals, and supported by CAP legislation, also reinforced the need for transparent supply chains—something retailers had to adapt to quickly and comprehensively (European Court of Auditors, 2011).

Recent CAP reforms, especially under the 2014–2020 and 2023–2027 programming periods have focused more on environmental sustainability, climate action, and support for short food supply chains (European Commission, 2025). Funding instruments have increasingly targeted small and medium-sized enterprises (SMEs) in the food processing sector and supported the development of local and artisanal processing facilities, short supply chains, and farm-based value addition (European Court of Auditors, 2016). Retailers have responded by embracing sustainability commitments, reducing food waste, and highlighting their local sourcing practices.

Beyond its direct and indirect effects on food processing and retailing, the CAP has shaped the broader food environment in which European consumers make dietary choices. Through subsidies favouring the production of cereals, dairy, and livestock, the early CAP contributed to a food system that prioritised calorie-dense and nutrient-poor products over fruits, vegetables, and legumes (OECD, 2005). This influenced the *availability, affordability, and acceptability* of different food categories, often to the detriment of healthy dietary patterns. These dietary patterns are linked to a higher incidence of NCDs, including obesity, type 2 diabetes, and cardiovascular disease. While CAP is only partly responsible, it has played a role in the structural alignment of agricultural production and public health. However, equally or more important is the influence of food processing, retail, and consumption practices, which determine how agricultural outputs are integrated into diets.

Linking agricultural policies with health and noncommunicable diseases

Agricultural policies influence ***food availability*** for consumers and food consuming industries – the *traders* and *distributors*, *primary processors*, *food manufacturers*, *wholesalers*, *retailers* and *food service outlets*, who purchase food before it reaches the consumers for final consumption: changes in availability are not just relevant for the final food consumers, but also for the food consuming industries, with the latter becoming more important as the primary consumers of agricultural products. Agricultural policies also influence ***food affordability*** for consumers. The food must be affordable for consumption to increase by the final food consumers/food consuming industries: agricultural policies implemented as part of market liberalisation have influenced farmgate prices (both up and down), so creating an incentive for the food consuming industries to substitute for the lower priced product, with implications for the nutritional quality and content of foods available in the consumer marketplace, but with no implications on food retail prices. In addition, agricultural policies influence ***food acceptability*** for consumers; the result is a heady combination of price and quality competition in the marketplace, with the apparent value-added encouraging a willingness to pay more for the product: changes in agricultural policies have created an enabling environment for food consuming industries to add value through product innovation and marketing, creating a market characterised by highly differentiated products which are targeted to individualised preferences, thus creating apparent value for consumers and increasing the acceptability of a wider variety and quantity of food (Hawkes et al., 2012).

Hawkes et al. (2012) demonstrated that the paradigm shift to more liberalised agricultural markets has increased specialisation of production, thus changing the ability and incentive of producers to supply some foods relative to others; affected farmgate prices, so changing the incentives for the food consuming industries to use some ingredients relative to others, thereby affecting the nutritional quality of foods available in the marketplace. However, there is no clear pattern when it comes to health; the changes have affected both “unhealthy” and “healthy” foods and ingredients. Vegetable oil exports have grown but so have fruit exports. The key implication for health, then, is not just whether the “ingredients” produced by agriculture are healthy or not, but on how they are substituted, transformed, and marketed relative to each other through the supply chain. “Healthy” soybean oil can become trans fats; “low fat” chicken can be combined with vegetable oils and cheap carbohydrates to make energy-dense fast food; fruit can be used as an ingredient in processed foods with a far higher calorie content.

According to Hawkes et al. (2012), policies that intervene directly in agricultural production to promote healthy eating are not likely to be effective or efficient if they do not take into account how foods are processed, distributed, and marketed through the system. In other words, intervening in production policies will do little if the supply chain dynamics are also not considered. The ability to substitute (and re-substitute) means that changing the production of one product (e.g. corn) could lead to the substitution by another (e.g. sugar, potato starch), or changing production of a product in one locality (e.g. meat in Europe) could lead to the substitution by imports (e.g. meat from Brazil). In addition, the processes of transforming foods mean that encouraging the production of a specific product (e.g. apples), does not necessarily mean there will be more of that product in the marketplace, but a processed food containing that ingredient (e.g. foods sweetened with apple juice).

Research should identify the drivers and different incentives faced by the food supply chain to produce the products they do along with the sources of incentives most responsive to leveraging the supply chain towards healthier eating. The food supply chain should be the

focus of analysis and intervention rather than agricultural production or the farm-holding. Although the potential for intervention in agriculture is rather limited, there are many opportunities to intervene at points along the supply chain to reduce disincentives and create incentives for improved food availability, affordability and acceptability – such as reducing incentives for vending machine operators to sell soft drinks in schools or reducing barriers to entry by innovative fruit and vegetable retailers. Policymakers should improve the food environment and create an environment supportive of the effective implementation of healthy eating. Analysis should identify "where, how, and for whom" value is created in the food supply chain and how it can be levered to improve dietary outcomes. Therefore, the interest of policymakers, researchers, health professionals and other relevant actors in the food system must focus on the food supply chain rather than concentrating only on agricultural policies. Engaging with the dynamics of the food supply chain can help to identify potentially effective policies and approaches to prevent unhealthy eating, obesity, and associated NCDs. Multi-component interventions at the food supply chain level tend to be the most effective in preventing cancer and other NCDs (see Figure 5).

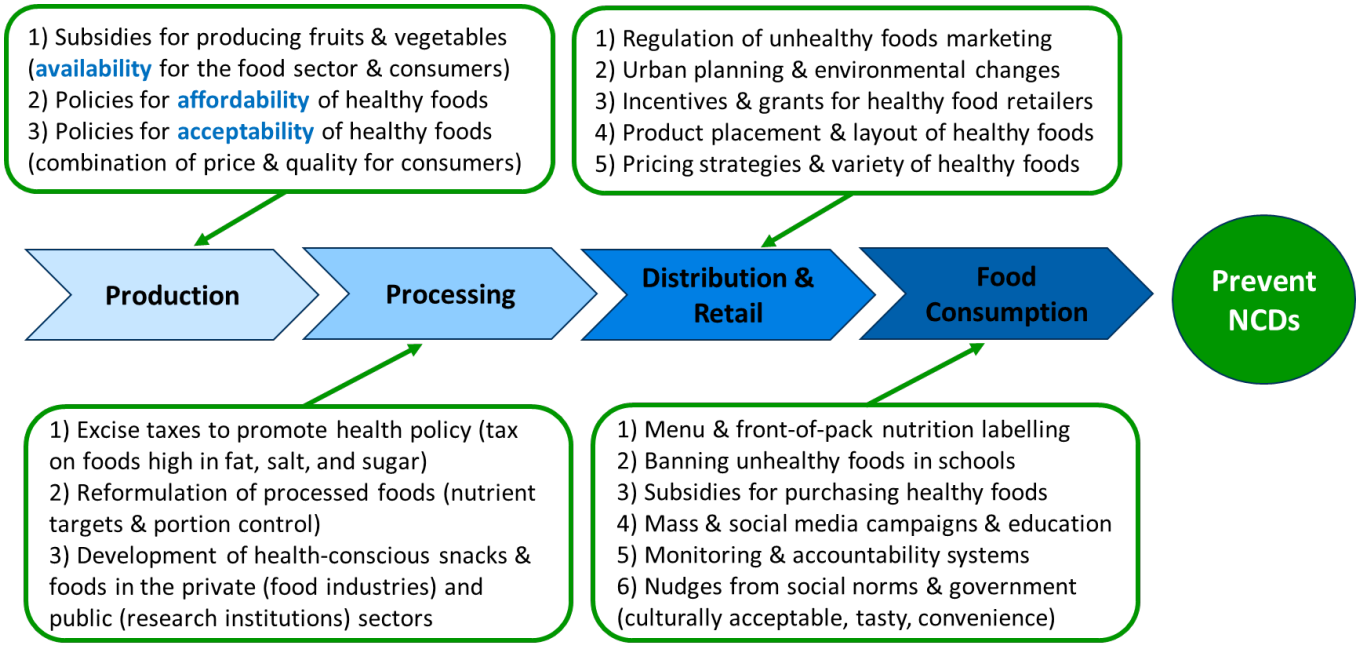

Figure 5. Points of intervention to promote health and prevent non-communicable diseases (NCDs).

Popkin and Reardon (2018) showed the links between nutrition transition and food systems dynamics—changes in the inputs, actors and activities relating to the production, processing, distribution, preparation, consumption, and disposal of food. There is a shift away from traditional diets to those higher in animal-sourced foods, vegetable oils, refined carbohydrates, and caloric sweeteners alongside changes in economic development and food systems change (Kearney, 2010; Popkin, 2006). The developments are closely linked with the industrialisation of food systems, technological change, and globalisation, including growth in the market and political activities of transnational food corporations and inadequate policies to protect nutrition in these new contexts. Therefore, understanding the drivers and dynamics of ultra-processed foods (UPFs) consumption is essential, given the evidence that these foods are linked with adverse health outcomes (Baker et al., 2020).

4. Nutrition Transition

The role of surplus grain production in Europe

The *huge surplus in grain production*—especially in the post-World War II era—played a key role in driving both the *high levels of industrial livestock production* and the *rise of ultra-processed foods* (UPFs). Ultra-processed foods (UPFs) in this report refers to processed foods containing high sugar, salt, saturated and trans- fatty acids as well as sugar-sweetened beverages and energy drinks that are nutritionally poor, energy-dense, and associated with increased disease risk.

Surplus grain versus industrial livestock production: from human to animal feed

As grain production (especially corn, wheat, and soybean) surged—thanks to agricultural subsidies, mechanisation, and chemical inputs—there was more grain than humans could consume directly. This excess grain was redirected to feed livestock, which lowered the cost of meat, dairy, and eggs as well as enabled the rise of large-scale, industrial animal farming.

As a result:

- grain-fed beef, chicken, and pork replaced more traditional, plant-based diets.
- animal-sourced ultra-processed foods like hot dogs, deli meats, chicken nuggets, and processed cheese became cheap and prevalent.

Surplus Grains and Ultra-Processed Foods (UPFs): Grain as Industrial Input

Surplus grains (especially corn, wheat, soybean) became the raw material base for the food processing industry. Surplus grains are used to create refined flours, corn syrup, glucose, and maltodextrin, along with starches, emulsifiers, and texturizers. These ingredients are the building blocks of UPFs, including sugary cereals, snack bars, baked goods, ready meals, and soft drinks.

From whole grains to empty calories:

- rather than being eaten as whole grains, the surplus was transformed into calorie-dense, nutrient-poor products.

- these foods are cheap, long-lasting, and highly profitable—driving their mass production and global spread.

Economic and policy drivers:

- subsidies in the EU, US, and other regions supported the mass production of commodity crops (e.g., maize, soybean, wheat).

- these policies distorted food systems, making it cheaper to produce and consume processed and animal-derived foods than fresh fruits, vegetables, or legumes.

Feedback loop:

More grain → More feed and processed ingredients

Lower meat and processed food prices → Higher consumption

Higher demand → Incentives to grow even more grain

The replacement of staple cereal grains (like rice, wheat, maize, and millet) by UPFs is a result of multiple social, economic, and policy-driven shifts over the past decades. This transformation is particularly evident in both urban and rural areas; thus, it has deep implications for health, food culture, and sustainability.

Consumption of ultra-processed foods

In Europe, the consumption of ultra-processed foods (UPFs) has significantly increased over recent decades, leading to a decline in traditional diets and staple foods such as whole grains, legumes, and minimally processed cereals. This trend is part of a broader "*nutrition transition*" driven by industrialisation, globalisation, and changing lifestyles.

Rise of UPFs in European Diets

UPFs now account from 10–50% of total calorie intake per day in many European countries (see listing below). Common UPFs include packaged breads, breakfast cereals, frozen pizzas, instant noodles, chips, processed meats, ready-to-eat meals, and sugary drinks.

Country	Share of calorie intake per day from UPFs
United Kingdom	~51%
Germany	~46%
Finland	~41%
Latvia	~33%
Italy	~13%
Portugal	~10%

(Source: Monteiro et al., 2018)

Displacement of Traditional Staples

i) Whole grain consumption has declined, replaced by refined white breads and sugary cereals.

ii) Traditional staple meals (e.g., porridge, lentil stews, home-baked rye bread) have been replaced by ready meals, processed snacks, and fast foods.

iii) Younger generations are less likely to cook or consume traditional dishes made from staple grains.

Key Drivers of the Shift to UPFs

i) Urbanisation and Time Constraints

Urban living and dual-income households result in less time for home cooking, leading to increased consumption of pre-packaged UPFs.

ii) Modern Retail Systems

The expansion of supermarkets and discount stores (e.g., Lidl, Aldi) has made UPFs cheap, abundant, and accessible.

Fresh, minimally processed foods—like legumes, whole grains, and fresh produce—are less promoted.

iii) Aggressive Marketing

UPFs are heavily advertised, especially to children and adolescents, promoting brand loyalty and habitual consumption.

iv) Cultural Homogenisation

Traditional food practices are being eroded as global brands and fast-food chains standardise diets across Europe.

Ultra-processed foods versus traditional staples: Case study from Finland

Historical Context: From Heart Disease to Reform

In the 1970s, Finland had one of the highest rates of heart disease in the world. The North Karelia Project (Puska, 2009) was a landmark intervention that promoted traditional foods, including rye bread, vegetables, and berries, and reduced butter and meat intake. The result was major drops in cardiovascular mortality and increased consumption of traditional staples like whole rye bread and oats.

Re-emergence of UPFs

Despite earlier progress, Finland has seen a resurgence in UPFs consumption in recent decades. In 1998, according to Monteiro et al. (2018), UPFs accounted for around 41% of total daily caloric intake in Finland. Popular UPFs include pre-packaged breads with additives, sugary breakfast cereals, ready-made meals, such as frozen meatballs and casseroles along with processed meats, snacks, and sweetened dairy products.

Displacement of Staples

Traditional cereals like whole oats and rye have declined in daily consumption, particularly among youth. Meals that once centred on boiled potatoes, root vegetables, and wholemeal breads are increasingly being replaced by pasta, white bread, frozen meals, and sweet snacks.

Findings from FinDiet 2017 Survey (THL, 2019):

Food Group	Trend (2007 → 2017)
Whole grain rye bread	↓ Decrease
Oatmeal/porridge	↓ Decrease
White bread	↑ Increase
Processed meat products	↑ Increase
Sweet snacks & desserts	↑ Significant

Contributing Factors to the Re-emergence of UPFs

i) Urbanization & Convenience Culture

- Fast-paced lifestyles in urban Finland have led to reliance on convenient, pre-made meals.
- Traditional food preparation (like baking rye bread or boiling potatoes) is less common among younger Finns.

ii) Supermarkets & Marketing

- Major Finnish grocery chains (e.g., S-Market, K-Citymarket) heavily stock and promote UPFs due to long shelf life and profit margins.

iii) Youth Habits & School Meals

- Though school lunches are regulated, children increasingly consume sugary cereals, processed snacks, and drinks at home.
- Adolescents are especially influenced by digital marketing of UPFs.

Public Health Implications

i) Overweight and obesity rates have risen, especially in children.

ii) Diet-related chronic diseases (e.g., type 2 diabetes, cardiovascular risk factors) are increasingly common despite Finland's earlier progress.

iii) The traditional Nordic diet, rich in wholegrains, berries, and fish, is at risk of being forgotten.

Finland represents a notable case study of how UPFs have increasingly displaced traditional staple foods, even in a country once known for major public health reforms and efforts to promote wholegrain-rich diets. The convenience culture is undermining the benefits of traditional Nordic diets based on wholegrains and root vegetables. Food activists argue that supermarkets and marketing are skewing public choices toward high-profit, low-nutrient foods. Therefore, Finland would benefit from reforms in its food system, for example: front-of-pack nutrition labelling to help consumers avoid foods containing high sugar, salt, saturated and trans- fatty acids along with additives; school meal reforms to reduce unhealthy UPFs and reintroduce traditional grains and vegetables; and public health campaigns encouraging the revival of traditional and wholesome foods.

5. The Rise of Ultra-Processed Foods in Food Systems

History of ultra-processed foods

Early Industrial Roots (19th–Early 20th Century)

Industrial Revolution (late 1800s):

- Mechanised food production began—canned foods, refined flour, and sugar became more widely available.
- Food preservation techniques (e.g., pasteurisation, canning) were developed to support urbanisation and longer supply chains.

World Wars (1914–1945):

- Demand for long-lasting, easily transportable foods led to innovations like powdered milk, instant coffee, and canned meats (e.g., luncheon meat).
- The military's need for non-perishable food accelerated the development of highly processed food technologies.

Post-War Boom and Convenience Culture (1945–1970s)

Rise of supermarkets and mass marketing:

- Packaged and branded processed foods flooded the market—breakfast cereals, frozen meals, soft drinks, and snack foods.
- Convenient and pre-made meals became symbols of modern convenience for the growing middle class.

Additives and preservatives:

- Use of synthetic colours, flavours, emulsifiers, and preservatives grew to improve shelf life, taste, and appearance.
- Highly processed foods were marketed as modern, hygienic, and time-saving.

Food Engineering and Global Expansion (1980s–2000s)

Food science breakthroughs:

- Introduction of high-fructose corn syrup (HFCS), flavour enhancers, and hydrogenated oils enabled the creation of hyper-palatable, energy-dense foods.

Global spread of fast food and packaged snacks:

- Brands like McDonald's, Coca-Cola, Nestlé, and PepsiCo expanded globally, making UPFs accessible worldwide.
- Supermarkets and convenience stores prioritised shelf-stable, processed products.

Diet culture and low-fat trends:

- "Diet" and "light" processed foods became popular, often replacing fat with sugar or artificial sweeteners—leading to a different kind of ultra-processing.

Health Concerns and Scientific Criticism (2010s–Present)

The NOVA classification (Monteiro et al., 2019)**:**

- Distinguished between unprocessed, minimally processed, processed, and ultra-processed foods.
- UPFs defined as formulations of industrial ingredients, lacking whole foods, and often high in salt, sugar, fat, and additives.

Health research findings:

- Growing evidence links UPFs to obesity, diabetes, heart disease, and even depression.
- Studies show UPFs can promote overconsumption due to their addictive textures and flavours.

Public pushback and regulation:

- Some countries have introduced warning labels, soda taxes, or restrictions on marketing UPFs to children.
- Movements toward whole foods, organic farming, and traditional diets gained traction in response.

Ultra-processed foods and availability of cheap calories

This report refers ultra-processed foods (UPFs) as energy-dense, hyper-palatable foods and drinks high in added sugars, fats, or salt. According to the NOVA classification (Monteiro et al., 2019), UPFs are industrial formulations with little or no whole food; contain chemical additives (emulsifiers, sweeteners, flavourings); created for taste, convenience, shelf life, and profit, not nutrition. A few examples are soft drinks, packaged snacks, instant noodles, processed meats, sugary cereals, and highly processed plant-based meat substitutes containing long ingredient lists, stabilizers, flavourings, refined oils and high in sodium. The history of UPFs reflects a broader shift toward industrial convenience at the cost of nutritional quality. From early innovations in preservation to today's hyper-engineered foods, UPFs have transformed diets—bringing convenience but also posing serious health challenges. The availability of cheap calories—largely through UPFs—is a defining feature of modern food systems.

How UPFs are providing cheap calories:

Industrial Efficiency and Economies of Scale

- Mass production of food ingredients like refined flour, sugar, vegetable oils, and corn syrup enables producers to manufacture large quantities at low cost.
- Food companies combine these with chemical additives (flavourings, preservatives, emulsifiers) to create shelf-stable, hyper-palatable products.

Low-Cost Raw Materials

- Many UPFs are based on subsidised commodity crops such as corn, soybean, wheat, and sugar.
- These inputs are processed into cheap ingredients that make high-calorie and low-nutrient foods inexpensive.

Long Shelf Life and Global Supply Chains

- UPFs are designed to be stored and shipped cheaply without refrigeration.
- This reduces costs for manufacturers, retailers, and consumers—making them more widely available, especially in urban and low-income areas.

How staple grains are being replaced by UPFs:

Urbanization and Lifestyle Changes

- Urban populations tend to prefer convenient, ready-to-eat food options due to busy lifestyles and limited time for cooking.

- Traditional cereal-based meals (e.g., whole grain porridges) are replaced by white bread, sugary breakfast cereals, instant noodles, and packaged snacks made with refined flour and additives.

Aggressive Marketing and Global Branding

- Multinational food companies heavily market UPFs—especially to children and in urban markets.
- Traditional foods made from staple grains are under-promoted and undervalued in comparison to colourful, branded UPFs.

Changes in Food Retail and Distribution

- Modern retail chains (supermarkets, convenience stores) favour long shelf-life and packaged products over fresh or bulk whole grains.
- Staple grains become less visible and accessible, while UPFs dominate shelf space.

Policy and Economic Incentives

- In many countries, agricultural subsidies favour cash crops and processed food ingredients over local grains.
- Trade liberalisation and global food systems encourage the import of cheap processed foods rather than supporting local grain-based diets.

Loss of Cooking Skills and Cultural Shifts

- Traditional preparation of grains requires knowledge and time, which are being lost in younger generations.
- UPFs offer immediate gratification and minimal effort, replacing culturally rooted grain-based meals.

The rise of cheap calories via ultra-processed foods (UPFs) is both a symptom and a cause of modern food system failures. While they have reduced food costs and increased convenience, they have done so at the expense of public health, nutrition equity, and sustainability. Addressing this issue requires systemic changes—not just individual dietary choices. Systemic changes must be multi-level, targeting the economic, regulatory, agricultural, and social systems that shape our food environment to address the prevalence of cheap and low-nutrient calories via the dominance of UPFs. Addressing the systemic dominance of unhealthy UPFs requires coordinated, long-term policy and cultural change, including *rethinking what we grow*, *how we process and distribute food*, and *how people access and understand food* (see Figure 5) as well as *who controls the food system*. Ultimately, we need to rebuild food systems that are nutritious, equitable, and sustainable centred not just on profits and economic growth but also on people.

6. Corporate Food Regime

Friedmann and McMichael (1989) combines political economy, political ecology, and historical analysis to explain how the relationship between food production and consumption is central to the functioning and reproduction of global capitalism. In the first global food regime (C*olonial food regime*: 1870–1930s), cheap food and raw materials from the tropical and temperate settler colonies fuelled industrialisation in Europe. Concurrently, the emerging settler states, led by the United States (US), provided Europe with wheat and meat, the dietary staples of the working class. The second food regime (*Postwar/Green Revolution regime*: 1950s–1970s) reversed the flow of food from South to North as a transfer of US agricultural surpluses to the South began in the form of food aid. This period was characterised by the global spread of industrial agriculture through the 'Green Revolution', which injected high-yielding varieties of a few cereals (wheat, maize, rice) coupled with the heavy use of subsidised fertilisers, pesticides, irrigation, and machinery into the agricultural economies of the Global South. The third, *corporate food regime* (1980s to the present) emerged from the global economic shocks of the 1970s and 1980s ushering in the current period of neo-liberal capitalist expansion. The corporate food regime is currently characterised by the unprecedented market power and profits of monopoly agrifood corporations, globalised animal protein chains, growing links between food and fuel economies, a 'supermarket revolution', liberalised global trade in food, increasingly concentrated land ownership, and a shrinking natural resource base (Holt Giménez and Shattuck, 2011).

The term "corporate food regime" refers to a dominant global food system that is shaped and controlled by powerful agribusiness corporations and financial interests. It is a concept used in political economy and food sovereignty circles to critique how food production, distribution, and consumption are increasingly influenced by corporate power, often at the expense of small-scale producers, environmental sustainability, and local food systems. Below are the key features of the corporate food regime:

Consolidation of Power

- A few multinational corporations dominate each stage of the food supply chain—from seeds and inputs (e.g., Monsanto/Bayer, Syngenta) to food processing and retail (e.g., Nestlé, PepsiCo, Walmart).
- This limits competition and often undermines small-scale farmers and local food businesses.

Global Commodity Markets

- Food is treated primarily as a tradable commodity, not a basic human right or cultural good.
- The system prioritises export-oriented agriculture over food sovereignty or self-sufficiency.

Industrial Agriculture

- Emphasis on large-scale monoculture, intensive livestock production, and use of synthetic fertilisers and pesticides.
- Often results in environmental degradation, biodiversity loss, and high greenhouse gas emissions.

Dependence on Fossil Fuels and Technology

- Heavily reliant on fossil fuels for production, processing, and transportation.
- Increasing use of biotechnology, GMOs, and precision agriculture—often controlled through patents and proprietary technologies.

Labor Exploitation and Displacement

- Agricultural workers and smallholders frequently experience poor labour conditions, low wages, and displacement due to land grabs and corporate expansion.

Policy Influence

- Corporations shape food and trade policies through lobbying, trade agreements, and partnerships with international institutions.

The corporate food regime has driven the proliferation of ultra-processed foods (UPFs) and affected consumers' nutritional and health outcomes The corporate food regime's promotion of UPFs has flooded markets with calorie-dense, nutrient-poor products that contribute directly to the rise of obesity and NCDs. This impact operates through engineered nutritional profiles, aggressive marketing, and structural manipulation of research and policy environments.

Corporate food regime and the supply of ultra processed foods

Below we explore the power dynamics within the corporate food regime and how they shape the supply of ultra-processed foods (UPFs):

Structural Power: Market Concentration & Control of Governance

Hyper-consolidation of markets
A small number of transnational corporations (e.g., Nestlé, Coca-Cola, PepsiCo, Unilever) dominate global food systems—from ingredients to retail. This intense market concentration grants them immense economic leverage that spills into political influence.

Corporate networks within governance spaces
Major UPFs corporations and their industry associations hold coordinated positions across multilateral, regional, and national policymaking arenas. They embed themselves through public–private partnerships, board memberships in global food institutions, and alliances with major stakeholders—effectively shaping rules and norms at the supranational level.

Instrumental Power: Lobbying, Political Access & Legal Influence

Direct lobbying and campaign financing
UPFs firms systematically lobby governments to resist public health policies—taxes, labelling rules, marketing restrictions—both behind the scenes and publicly.

Revolving doors
Executives regularly move between industry and government roles, embedding corporate interests within regulatory bodies and blurring lines of accountability.

Legal threats & lawsuits
Companies have used litigation to challenge and discourage regulation—mirroring tactics from the tobacco industry's policy dystopia model.

Discursive Power: Framing Public Narratives & Scientific Discourse

Capture of scientific research
UPFs corporations sponsor studies, front groups, and nutrition networks to cast doubt on the health harms of their products. For instance, Coca-Cola funded the Global Energy Balance Network to shift blame for obesity toward sedentary lifestyles rather than sugar consumption.

Marketing power & information asymmetry
These firms craft messages framing UPFs consumption as a matter of personal choice and convenience or promoting self-regulation over governmental intervention. Their marketing budgets often surpass those of tobacco and alcohol sectors combined, reinforcing brand dominance.

Strategic Market Power: Barriers & Ecosystem Control

Processed food giants deploy market strategies to limit competition via mergers and acquisitions; raise entry barriers for new firms; dominate supply chains (from suppliers to retailers); exploit consumer informational asymmetry with superior branding and marketing.

The corporate food regime exerts layered and coordinated power—structural, instrumental, discursive, and market-based strategies to ensure the continued proliferation of UPFs (see power matrix below). This power matrix systematically resists public health interventions, shapes global, regional, and national policies as well as defines what is deemed acceptable food and nutrition practice. To change the power dynamics of the corporate food regime and improve nutrition—especially in preventing NCDs—requires a multi-level transformation. This means shifting power away from concentrated corporate control and toward democratic, equitable, health- and sustainability-focused food systems.

Power Matrix Overview

Power Type	Mechanism	Impact on UPFs Supply
Structural	Market consolidation, corporate roles in governance	Prevents regulation, maintains dominance
Instrumental	Lobbying, revolving doors, lawsuits	Blocks taxes, labelling, public-health policies
Discursive	Control of nutrition science and public narrative	Sows doubt, shapes norms toward UPFs consumption
Market Strategies	Mergers & Acquisitions, supply chain dominance, branding, & public relations	Ensures widespread penetration & preference for UPFs

Corporate food regime and the Unfair Commercial Practices (UCP) Directive

Within the EU, regulatory instruments such as the Unfair Commercial Practices (UCP) Directive [2005/29/EC] play a role in protecting consumers from deceptive and aggressive marketing practices. The UCP Directive applies broadly to commercial practices before, during, and after a transaction, across all sectors, including food. The UCP Directive provides

mechanisms to constrain certain harmful practices within the corporate food regime, however, it is insufficient as a standalone tool to systematically promote health and prevent NCDs because of its focus on consumer protection only.

The UCP Directive establishes a legal framework to prohibit unfair, misleading, and aggressive commercial practices in business-to-consumer transactions across the EU. Relevant provisions include:

- Misleading Food Marketing: The UCP Directive can be invoked to challenge deceptive marketing of unhealthy food products, especially where health claims or marketing practices mislead consumers.
- Advertising to Children: If marketing practices exploit children's vulnerability, they may violate the UCP Directive.
- Omission of Critical Information: Failure to provide essential product information (e.g., nutritional facts such as high sugar or fat content) may be deemed unfair under the UCP Directive.

For example, the UCP Directive has been cited in efforts to restrict misleading "health halo" claims on sugary cereals and snacks (Garde, 2014). EU countries have used the UCP Directive framework to challenge misleading "healthy" claims on sugary cereals. Certain aggressive marketing of fast food to children has been scrutinised under the UCP Directive principles.

Limitations of the UCP Directive in governing the corporate food regime

- The UCP Directive focuses on individual transactions and consumer protection, not systemic reform of the food system.
- It does not directly regulate product composition (e.g., sugar, salt, fat content).
- It does not address structural factors like agricultural subsidies, corporate power concentration, or food supply chains.
- Enforcement varies widely between EU Member States.
- The UCP Directive is reactive — it addresses unfair practices after they occur rather than proactively shaping healthy food environments.

The UCP Directive provides important legal tools to address certain harmful marketing practices within the corporate food regime. However, its focus on consumer protection mean that it cannot systematically alone promote health and prevent NCDs. A comprehensive regulatory framework, integrating product reformulation, marketing restrictions, fiscal policies, and governance reforms as well as other actions are essential to reshape the corporate food regime towards healthier and more equitable outcomes. There are many factors impeding necessary progress on policy change because today’s food systems operate against a background of policy distortions. Consequently, the policy distortions need to be addressed at the outset of food systems transition, or they will prevent policy change.

7. Future Food Systems

The evidence-based report by the Global Panel on Agriculture and Food Systems for Nutrition (2020) offers policy solutions to improve the quality of diets by using a food systems approach. The report demonstrated that healthy diets for all can only be delivered if they are sustainable, and if their accessibility and affordability are an integral part of how food systems function. Food systems and the planet's natural resources are closely linked. A key principle is to ensure that both food systems and natural resources are nurtured in ways that support sustainable and healthy diets. Food systems –from supply to demand – must support both human and planetary health, and actions to protect natural resources and mitigate climate change must also support the goals of sustainable food systems.

Factors impeding necessary progress on policy change

Below are the factors hindering policy change listed by the Global Panel on Agriculture and Food Systems for Nutrition (2020):

1. *Powerful actors pull in different directions*, motivated by factors unrelated to health or food system sustainability. The private sector plays a crucial role in feeding the world, but at the same time often promotes foods which are not conducive to healthy diets and profits from a food system that over-exploits natural resources. The benefits accrue mainly to private sector stakeholders while the costs are mainly borne by the public sector. The imbalance must be addressed at the outset of food systems transition; thus, it is essential that the public and private sectors collaborate on clear and mutual goals.

2. *Misaligned policy incentives distort food system goals*. Policy instruments and incentives along with responsibilities created by public policy makers, including subsidies and food-related research and development, must be coherent to support human and planetary health jointly to support the goals of sustainable food systems as well as to capture opportunities for jobs and income growth.

3. *Short-termism and siloed agendas*. The transition of food systems requires a long-term focus and a consistent set of commitments and actions. Dietary patterns, drivers of dietary choice, and sustainability of food system practices must emphasise on ***transitioning food systems from feeding people cheaply to nourishing people sustainably***. Addressing the policy distortions will only be possible if decision makers show leadership to steer the policy changes, but governments have been passive in reforming food systems and influencing the drivers of dietary choice due to competing priorities. Sustainable and healthy diets are viewed as a lesser priority when hunger is considered a major challenge in several parts of the world. Many inherent problems in the food systems are global, but actions are also vital at the national and local levels.

Goals to better protect our planet and nourish the global population

Sustainable food systems must be economically viable, ecologically responsible, nutritionally adequate, socially equitable, and culturally acceptable. We can nourish a growing population while regenerating the planet's ecosystems by transforming how we produce, consume, and value food. The Global Panel on Agriculture and Food Systems for Nutrition (2020) listed four goals to enable food systems to better protect our planet and nourish the global population:

1. *People need to be empowered and encouraged to eat healthy diets which are sustainably produced*. Collectively, consumers have considerable power to influence food-industry priorities and drive change through their purchases and food choices.

2. *Food systems must be better aligned with the aim of supporting sustainable and healthy diets*. Major reforms and changes are needed from primary production until retail and final consumption. The reforms and changes are required to solve significant challenges relating to inadequate availability, physical accessibility, affordability, and desirability of sustainable and healthy diets.

3. *The impacts of food systems on climate, natural resources, and biodiversity must be substantially reduced*: i) adopt sustainable farming practices like regenerative agriculture; ii) shift diets toward more plant-based and less resource-intensive foods; iii) reduce food waste across production, distribution, and consumption stages; iv) protect ecosystems and biodiversity by limiting deforestation, preserving habitats, and promoting crop diversity; and v) support policy and innovation that incentivises low-impact food production and responsible consumption.

4. *Greater resilience must be built into local, national, and global food systems*: i) diversify crops and supply chains to reduce dependency on single sources, ii) strengthen local food systems through support for smallholders and urban agriculture, iii) invest in climate-smart infrastructure like water-efficient irrigation and storage, iv) enhance early warning systems and disaster preparedness for different types of shock, and v) promote inclusive policies that empower vulnerable groups and ensure equitable access to sustainable and healthy foods.

Actions to transition the food systems towards sustainable and healthy diets

Food systems consist of a set of interlinked sub-systems, including production, processing, distribution, consumption, and waste management. These sub-systems are connected through environmental, economic, and social factors, meaning changes in one area (e.g., agriculture) can impact others (e.g., nutrition or climate). A holistic approach is essential to understand and manage their complex interactions. The Global Panel on Agriculture and Food Systems for Nutrition (2020) provided four distinct policy objectives to transform the food systems:

1) Ensuring the availability and sustainable production of nutrient rich foods

- Reforming public sector subsidies to enhance the supply of nutrient-rich foods.
- Rebalancing public agricultural research and development from a commodity focus to a food-systems focus. Increase research funding especially for actions that boost the supply of nutrient-rich foods through sustainable and resilient farming systems.
- Readjusting food production systems to deliver sustainable and healthy diets by investing in different approaches, goals, metrics of success, and reward systems. A significant realignment of investment patterns, market agendas, policy priorities, and on-the-ground activities would be needed. This would require a substantial focus on the promotion of system-wide efficiency gains over a single narrow focus on productivity gains in individual agricultural outputs.

2) Making sustainable and healthy diets accessible to all

- Using trade policies effectively to achieve the goal of sustainable and healthy diets.
- Governments should resist the imposition of export restrictions at times of sharp food price spikes and look instead to lowering tariffs and value-added taxes to encourage trade flows.
- Support investments in the infrastructure needed to optimise food value chains.
- Generate jobs across the food systems to provide employment and income.
- Significantly reduce food loss and waste to preserve nutrients along the value chain.

3) Making sustainable and healthy diets affordable to all

- Economic growth with measures to tackle poverty and income inequality.
- Design taxes and subsidies on key food categories to shift the relative prices of ultra-processed foods versus nutrient-rich foods in ways that make healthy foods more affordable.
- Refocus safety nets to support diet-quality instead of quantity of foods.
- Reducing the cost of nutrient-rich foods through research and innovation.

4) Making sustainable and healthy diets desirable by influencing demand

Merely making sustainably produced and healthy foods available and affordable does not mean that people will choose them. Influencing dietary choice is vital to boost healthy eating, but it is also crucial to promote sustainability in food systems. Current diets involve negative feedback loops which propel dysfunctions in food systems. For example, agricultural production driven by the demand for meat consumption that have environmental externalities resulting in deforestation and soil depletion due to the extensive production of animal feeds. In addition, monocropping can exacerbate biodiversity loss causing pollinator populations to decline, thus yields are reduced. Comprehending these vicious circles and the role of diets is critical to restrain the dysfunctions and promote sustainable food systems. Many elements influence current diets and food choices: advertising, taste, convenience, social and cultural norms, and nutritional knowledge. We have to balance the perceived trade-offs between long-term health benefits and immediate gratification of tastier but less healthy foods.

How to influence demand?

- Consumers' collective purchasing power can be a powerful force to drive food system transition and stimulate market growth for sustainable and healthy foods. It is necessary to establish a common agenda across government and private sector stakeholders in defining desirable scenarios for future food systems locally and nationally to promote consumer awareness of planetary and health implications of food choices.
- Behavioural nudges are an important tool, but it is essential to trial different approaches and implement what works best.
- Reduce and regulate advertising of ultra-processed foods to children and promote dynamic marketing of sustainable and healthy diets for all. Self-regulation in the form of voluntary guidelines has been shown to be predominantly ineffective in reducing the number of food advertisements promoting unhealthy diets: sugar-sweetened beverages, snacks, and toy-branded fast foods aimed at children.

- Engagement between public and private sectors to define responsibilities in moving towards common goals. The guiding questions for policy makers are: what are the appropriate incentives that would persuade food companies and retailers to make the required changes, recognising their different priorities? Is regulation required when persuasion and self-regulation are ineffective? Examples of best practices in different countries will serve as a guide to move forward.
- Citizens must be empowered by information: nutritional guidelines need to be improved and used much more effectively. Consumers need advice which is authoritative and trustworthy that cuts through erroneous, conflicting, and variable advice which is prevalent in the mass and social media. Are the nutritional guidelines user-friendly, addressing both issues of health and sustainability as well as helping policy makers to make well-informed decisions?

Issues hindering progress in policy change for future food systems

Approach	Description	Evidence of Effectiveness	Main Risks / Concerns
Industry Self-Regulation	Voluntary codes, pledges, or commitments by food/beverage companies (e.g., marketing restrictions, reformulation)	Weak or no measurable impact on reducing unhealthy food marketing, improving diet quality, or lowering disease risk	Loopholes, selective participation, poor enforcement, serves as a strategy to delay regulation
Public–Private Partnerships (PPPs)	Collaborations between governments, NGOs, and corporations to address nutrition/health goals	Mixed results; generally little or no evidence of population-level improvements in diet or health	Conflicts of interest, corporate capture, "health-washing," distraction from stronger regulation
Statutory Regulation	Legally binding government policies (e.g., sugar taxes, warning labels, marketing restrictions, reformulation mandates)	Strongest evidence base in reducing consumption of unhealthy foods, shifts industry practices, improves health outcomes over time	Requires political will; industry opposition; enforcement challenges

Practical considerations for advancing policy changes

Why it is difficult to make major changes in policies within the public and private sectors? The Global Panel on Agriculture and Food Systems for Nutrition (2020) listed the reasons below.

1. Policy actions on food, health, agriculture, and climate are generally managed separately – *there is a need for 'Health in All Policies' and not working in silos*. It is critical to convince relevant policy makers to embed the importance of sustainable and healthy diets to their respective policy agendas, plans, and strategies.

2. Competing priorities for i) governments who must make difficult policy choices with financial constraints, ii) private companies making investment choices on product portfolios or retail strategies, and iii) households making food-purchase choices.

3. Uncertainty and mistrust in scientific evidence which is exacerbated by political polarisation and social media. Improvements are required for research to better support policy decisions.

The Global Panel on Agriculture and Food Systems for Nutrition (2020) recommended three sets of actions.

1. **Resolve policy distortions and incoherence**

- Review and identify existing policies, strategies, and institutional mandates that support or hinder coherent actions towards the goals of a sustainable food system – try to resolve policy incoherence across sectors and ministry responsibilities for transforming the food system towards sustainable and healthy diets. It is crucial to know what the trade-offs are due to competing goals and interests as well as address current and future issues.
- Implement a review to determine what public funding and institutional mandates could be adjusted to cover the costs of facilitating the transition towards sustainable and healthy diets.

2. **Establish multi-win targets that can be attractive to multiple constituencies**

- It is important to establish targets that deliver multiple benefits simultaneously by initiating national and local dialogues along with expert commissions to define benefits on several fronts through carefully costed interventions.
- Use clear messaging and incentives to persuade business leaders and the private sector to support national plans of action relating to both human health and sustainability.

3. **Leverage on existing food-system friendly interventions**

- Identify policy instruments that can be expanded with the goal of promoting sustainable and healthy diets for all, e.g., various income transfer programmes and business promotion initiatives.
- It is important to demonstrate how returns on investment can be determined through costed health and environmental outcomes, not just income growth. This requires identifying current interventions that could bring multiple gains.'
- Actions are needed to increase the availability of nutrient rich foods by realigning domestic agricultural research and development, enhancing technical assistance to farmers, incentivise private companies to promote foods beyond staples along with reviewing subsidy, tax, and tariff policies which influence food prices.
- Promote greater efficiency along the food value chains, including the reduction food loss and waste.
- Rebalance the relative prices of nutrient-rich foods with ultra-processed foods via subsidies, taxes, and tariff policies.

Each of these steps does not require major new funding, but the potential for greater policy coherence and impact across the food system is significant. There is considerable potential for the research community to support policy makers, who are facing difficult decisions at the intersection of human and planetary health. Policy makers are confronted with rapidly evolving scientific views across multiple disciplines, but there is too much research that fails to meet the most pressing needs of policy makers, especially in relation to managing policy trade-offs and costs. Therefore, interdisciplinary perspectives are truly needed to address the diversity and complexity of global and local food systems.

Case Study: Tobacco Control

Tobacco is chosen as a case study because all forms of tobacco use are harmful, and there is no safe level of exposure to tobacco. According to the World Health Organization (WHO, 2023), the tobacco epidemic is one of the biggest public health threats the world has ever faced, killing over 8 million people a year around the world. More than 7 million of those deaths are the result of direct tobacco use while around 1.3 million are the result of non-smokers being exposed to second-hand smoke. Across the globe, around 3.5 million hectares of land are converted for tobacco growing each year. Growing tobacco also contributes to deforestation of 200,000 hectares per year (Geist, H.J., 1999). Tobacco farming, production, consumption, and use are detrimental to both the surrounding environment as well as the health of farmers and tobacco users. With an annual greenhouse gas contribution of 84 megatons carbon dioxide equivalent, the tobacco industry contributes to climate change and reduces climate resilience, wasting resources, and damaging ecosystems.

Free trade of tobacco is causing deforestation and impeding the achievement of the Sustainable Development Goals

Currently, most of the tobacco products are imported into the EU market with zero tariffs and without quota restrictions through free trade agreements as well as trade preferences granted to developing and least developed countries (EU Customs, 2025). For example, concerning the free trade area between the EU and African, Caribbean and Pacific (ACP) countries, tobacco products can enter the EU market without paying tariffs or duties via the Economic Partnership Agreements. The Everything but Arms (EBA) scheme removes tariffs and quotas for the imports of all tobacco products coming into the EU from the least developed countries. The EU aims to use its trade agreements as tools to pursue sustainable development and encourage trading partners to uphold and improve environmental and human rights standards in their own countries as well as to mitigate climate change globally. However, this is not true concerning the liberalisation of trade in tobacco products. Across the globe, around 3.5 million hectares of land are converted for tobacco growing each year. Growing tobacco also contributes to deforestation of 200,000 hectares per year (Geist, 1999). The WHO (2017) assembled existing evidence on the ways in which tobacco affects human well-being from an environmental perspective – i.e. the indirect social and economic damage caused by the cultivation, production, distribution, consumption, and waste generated by tobacco products.

Moreover, EU member countries have not ratified the agreement with the Mercosur countries (Argentina, Brazil, Paraguay, and Uruguay) due to environmental concerns related to the deforestation of Brazilian rainforests. The destruction of rainforests is one of the driving forces to enact the EU Deforestation Regulation (EUDR) — EU's new regulation to curb EU market's impact on global deforestation and forest degradation (EU Regulation 2023/1115). The EUDR requires companies trading in cattle, cocoa, coffee, oil palm, rubber, soya, and wood to conduct extensive due diligence on the value chain to ensure the goods do not result from recent deforestation (post 31 December 2020), forest degradation or breaches of local environmental and social laws. Tobacco is also grown as a cash crop in more than 125 countries and is a major cause for deforestation. EU member countries are major exporters and importers of tobacco products in the world. The EU is partly responsible for the deforestation as a major consumer and trader of tobacco products. Unfortunately, tobacco is not included in list of products under the EUDR, thus there is no due diligence to prevent

tobacco-related deforestation that is prevalent in African countries such as Malawi, Tanzania, and Zimbabwe due to tobacco cultivation and curing (WHO, 2017).

Tobacco use contributes to poverty by diverting household spending from basic needs such as food and shelter to tobacco. This spending behaviour is difficult to curb because tobacco is so addictive. The economic costs of tobacco use are substantial and include significant health care costs for treating the diseases caused by tobacco use as well as the lost human capital that results from tobacco-attributable morbidity and mortality (WHO, 2023). With increasing tobacco controls in the developed world, Africa can be seen as the last frontier for the tobacco industry. Smoking prevalence here is still not high. Without effective tobacco control regulations, the market potential in Africa for the tobacco industry can be immense. Low labour cost, as well as the right climate conditions, make these African countries easy prey for the tobacco companies. There are numerous negative effects of tobacco growing in Africa on farmers' income, child labour, gender, and food & nutrition security. Many tobacco farmers in Africa make very low profits or farmers are highly indebted because the price of tobacco leaf is low and mainly controlled by the tobacco industry through a stringent leaf grading system (Hu and Lee, 2015).

Malawi has the highest occurrence of child labour with 78,000 children who work on tobacco estates, for long hours, with low pay and without protective clothing. In Uganda, tobacco growing communities have their children failing to start school, where 4 out of 10 boys never go to school and 6 out of every 10 girls never go to school because they have to provide labour to the tobacco farms all year round. Women and children are the main source of labour for tobacco growing, mostly done by hand, without any protective wear. Tobacco farming in Africa mainly survives on family labour, where women and children provide most of the labour to minimise costs because tobacco farming requires an average of 18 hours per farmer per day. The International Labour Organization revealed that children working on tobacco plantations/farms in Tanzania did not get adequate food, whereby out of 100 working children in the tobacco growing districts, only 19% had meals three times a day.

Overall, international trade of tobacco products and tobacco farming in Africa is impeding the achievement of many Sustainable Development Goals (SDGs) — SDG 1 (No Poverty), SDG 2 (Zero Hunger), SDG 3 (Good Health and Well-being), SDG 4 (Quality Education), SDG 5 (Gender Equality), SDG 8 (Decent Work and Economic Growth), SDG 12 (Responsible Consumption and Production), SDG 13 (Climate Action), and SDG 15 (Life on Land). Therefore, tobacco control in trade preferences, bilateral and free trade agreements could positively contribute to the attainment of the SDGs by excluding tobacco products from the commitments of trade liberalisation. Tobacco must be included in list of products under the EUDR to mitigate climate change globally as well as to uphold and improve environmental and human rights standards, especially in Africa with the fastest growing population in the world.

Explicit trade provision in the WHO FCTC to control global tobacco trade

The WHO Framework Convention on Tobacco Control (FCTC) has led international tobacco control efforts for more than two decades and was the first specific treaty and instrument that emphasised prevention through influencing the behavioural risk factors — tobacco use. The WHO FCTC has been widely regarded as a significant achievement in global public health efforts to control tobacco use since its adoption in 2003, currently with 183 Parties covering more than 90% of the world population. WHO FCTC has facilitated the development and

implementation of evidence-based tobacco control policies at national, regional, and global levels that encompass various policy areas such as tobacco taxation, smoke-free environments, packaging and labelling, advertising, and support for tobacco cessation.

The implementation of FCTC measures has contributed to significant reductions in tobacco use prevalence, exposure to second-hand smoke, and tobacco-related morbidity and mortality in many countries (Chung-Hall et al., 2019; Chen et al., 2023). Despite these achievements, however, the implemented measures have focused mainly on demand reduction and less on the supply side. On the supply side, illicit trade of tobacco products has received considerable attention via the WHO Protocol to Eliminate Illicit Trade in Tobacco Products. Yet, the interrelation between legitimate international trade and public health remains neglected, and trade of tobacco products continues to increase globally.

Free trade of tobacco is uncontrolled due to trade liberalisation globally. Tobacco consumption is the single largest avoidable health risk and the most significant cause of premature death and currently causing every year about 700 000 deaths in the EU and about 8 million deaths globally, thus controlling international trade of tobacco products is vital. The relation between international trade and public health should be emphasised in the WHO FCTC (Mamudu et al., 2011).

International trade of tobacco products and tobacco farming is impeding the achievement of numerous SDGs. Therefore, the adverse impacts of trade liberalisation could be negated by excluding tobacco products from the commitments of trade liberalization in free trade agreements as well as trade preferences. Individual countries, or even regions, may be powerless in addressing free trade, especially if confronted with interference and influence from the tobacco industry. Close collaboration between the WHO and World Trade Organization (WTO) is crucial to find ways for exempting tobacco products from trade liberalisation. This would support the adoption of forward-looking tobacco control measures to better protect the health of present and future generations.

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