

Policy tools for sustainable and healthy eating

Enabling a food transition in the Nordic countries



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Executive summary

This report delves into the gap between prevailing Nordic diets and the Nordic Nutrition Recommendations (NNR) 2023, emphasizing the necessity of implementing policy instruments designed to guide the food environment towards fostering significant behavioural change. It highlights the responsibility of governmental agencies in steering the food environment to achieve substantial behavioural shifts necessary for embracing healthier and more sustainable dietary patterns.

Scholarly emphasis on behavioural shifts informs the report's comprehensive analysis of determinants that influence a transition towards healthier eating habits. It introduces a Nordic behaviour change framework that prioritizes enhancing the availability, affordability, accessibility, and attractiveness of healthy food options, concurrently diminishing these aspects for unhealthy choices. This framework identifies determinants across food-related, personal, and socio-environmental spheres, shedding light on the critical influence of early food experiences, demographic factors, education, financial stability, cultural norms, and social determinants on dietary behaviours. Targeted interventions aimed at augmenting capability, opportunity, and motivation at various societal levels are identified as crucial for catalysing meaningful dietary transformation.

The report underscores the criticality of policy instruments that address economic variables, provide information, and leverage nudging strategies to incentivise healthier dietary selections. It advocates for a multifaceted policy approach encompassing taxes, subsidies, directives for public procurement, public awareness campaigns, educational initiatives, and labelling regulations as instrumental interventions. It underscores the need for proactive government action and strategic policy measures as essential to fostering healthier and more sustainable dietary patterns.



The report illustrates the necessity for governmental bodies, in collaboration with the food industry, retailers, and other stakeholders, to pursue a unified strategy. This strategy should effectively blend regulatory actions—like taxes and subsidies—with strong public procurement policies, the establishment of a Nordic Climate Label, and targeted efforts to limit the marketing of unhealthy food products. The aim is to harness a collective, synergistic approach, utilizing the Nordic behaviour change framework to implement complementary measures that together promote the development of healthier and more sustainable food consumption within the Nordic region.

The report outlines five recommendations, emphasizing collaboration across policy and industry to steer consumer behavior for a healthier, greener world.

1. Introduction

In June 2023, the sixth edition of the Nordic Nutrition Recommendations (NNR2023) was released. The NNR2023 is a comprehensive set of research-based recommendations to the Nordic national authorities and forms the scientific foundation for all dietary guidelines offered by the Nordic countries. For the first time, the NNR2023 consider both nutritional and environmental aspects of food consumption.

The extended focus on environmental aspects of food consumption in NNR2023 is a recognition of the challenges in the current food system that cause significant environmental harm globally. Changes throughout the entire food system are needed, including changing dietary choices, and eating habits. It is well known that eating habits and attitudes toward food are shaped by numerous factors. One significant factor is the food environment, which includes both the social and physical surroundings where people live (European Commission 2020). The supply of food, the accessibility of food, how it is marketed, and societal and cultural norms play crucial roles within the food environment. These factors are mainly external to the individual. However, education level, income and gender also wield considerable influence over a person's food consumption behaviour.

The current food behaviour of consumers in the Nordic countries does not comply with neither health nor environmental recommendations (Blomhoff et al. 2023; Gorski and Roberto 2015; Lemming and Pitsi 2022). Consequently, there is a need to understand how behavioural change may be achieved in the Nordic countries. Several barriers for changing people's behaviour have been identified, and these include individual resistance, the prevailing food culture, existing policies, transaction costs, vested interests, geographical location, and a perceived shortage of research (Wood et al. 2019). At the heart of these barriers lies the fact that food is an inherently interdisciplinary topic, intricately linked to our personal lives and deeply rooted in our social and cultural backgrounds. The current food environment is also supported by a comprehensive economic structure and accompanying infrastructure, and effecting change necessitates engagement at various levels, involving stakeholders from both the public and private sectors, as well as civil society.

Research indicates that placing the responsibility solely on individuals to eat healthy and sustainably has less impact compared to creating an enabling environment that provides easy access to affordable, delicious, and nutritious food (Blomhoff et al. 2023; Lemming and Pitsi 2022; Wood et al. 2019). These points, among others, were also highlighted during a workshop organised by the project on 29th March 2023, which brought together key stakeholders and experts in the field to discuss the transition

towards a healthy and sustainable food future (Strömgård 2023). Behaviour changes are essential for this transition. Policymakers can support changes in individual behaviour through the implementation of policy instruments and actions. Therefore, this report examines various policy instruments and actions available to guide dietary shifts towards healthier and more sustainable diets. To guide this work, we have three project questions:

WHICH?	HOW?	WHAT?
What factors influence individual's dietary choices and behaviours; and how do they interact with public policy interventions towards better diets?	How can insights into the factors influencing behaviour guide and inform interventions by policy instruments that encourage healthier dietary habits?	What policies and actions can be effective tools to enable behavioural change among Nordic citizens to adopt better diets?

While recognizing the significant impact of the broader food environment on behaviour change, including food production processes and methods that enhance health through the supply of diverse and natural foods (e.g., less processed foods), this report primarily focuses on the consumption side of the food system. It discusses policy instruments that the state and other public actors could introduce to facilitate behaviour change towards better diets. Our approach to address these questions begins with identifying the discrepancies between current food consumption patterns and the recommendations set forth by the NNR2023. We then present a behaviour framework to illustrate how various determinants influence our dietary choices. This is followed by an overview of policy instruments and actions that can support healthy and sustainable food consumption. Finally, we link the behaviour framework with the policy instruments to demonstrate how policy instruments may lead to behaviour change.

Based on the findings of this report and project, we develop five recommendations for policymakers to enhance public health and environmental sustainability throughout the Nordic Region.

Glossary and concepts

This glossary includes terms commonly used in different chapters of the report.

Behavioural change A behavioural change can be a temporary or permanent effect that is considered a change in an individual's behaviour when compared to previous behaviour (Darnton 2008).

Body Mass Index (BMI) BMI is a frequently used measure that uses a person's height and weight to indicate if the person's weight is healthy. The measure is a number based on a person's weight in kilograms divided by the square of height in meters. A BMI between 18.5 to 24.9 is considered within the normal range.

Food consumption The act of using, eating, or drinking something (Cambridge Dictionary).^[1]

Nordic countries/regions The Nordic countries (also known as the Nordics or Norden; lit. 'the North') are a geographical and cultural region in Northern Europe and the North Atlantic. It includes the sovereign states of Denmark, Finland, Iceland, Norway and Sweden; the autonomous territories of the Faroe Islands and Greenland; and the autonomous region of Åland.

Food environment "Food environments are the physical, economic, political and socio-cultural contexts in which people engage with the food system to make their decisions about acquiring, preparing and consuming food",^[2] and "The food environment is the interface that mediates people's food acquisition and consumption within the wider food system. It encompasses external dimensions such as the availability, prices, vendor and product properties, and promotional information; and personal dimensions such as the accessibility, affordability, convenience and desirability of food sources and products".^[3]

Nordic Nutrition Recommendation 2023 (NNR2023) dietary advice: "Overall, we recommend a predominantly plant-based diet rich in vegetables, fruits, berries, pulses, potatoes and whole grains, ample amounts of fish and nuts, moderate intake of low-fat dairy products, limited intake of red meat, white meat, processed meat, alcohol, and processed foods containing amounts of added fats, salt and sugar" (Blomhoff et al 2023).

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1. <https://dictionary.cambridge.org/dictionary/english/consumption>
 2. European Public Health Alliance: <https://epha.org/what-are-food-environments/>
 3. European Commission (2020) Towards a sustainable food system. Moving from food as a commodity to food as more of a common good: <https://op.europa.eu/en/publication-detail/-/publication/ca8ffeda-99bb-11ea-aac4-01aa75ed71a1>

Policy instrument: A policy instrument is a measure or a tool used by governments or public authorities at different levels to achieve certain policy objectives (Banerjee et al. 2021). Public policy instruments can take various forms including regulatory (laws, regulations), economic (taxes, subsidies, charges), information campaigns and direct government intervention (public provision of services). The choice of instruments depends on the policy objective (Macura et al. 2022).

2. Food consumption in the Nordic countries

Nordic diets are unsustainable at present and their impact on the climate is substantial. The high impact especially stems from the significant intake of animal-based products (Blomhoff et al 2023; Klimarådet 2021; Wood et al. 2019). Denmark's food consumption leads to some of the highest climate impacts globally, with CO₂ emissions 45 percent above the global average. This is primarily due to the country's significantly high consumption of animal-based foods (Klimarådet 2021:12). Likewise in Finland, the intake of dairy and meat are responsible for 65 percent of the climate impact from Finnish diets (Matschoss 2022) and in Norway, dairy and meat account for approximately 80 percent of carbon emissions from food (van Ort & Holmelin 2019).

From a health perspective, the Nordic countries have witnessed an increase in obesity over the last decades (Jørgensen et al. 2010). Today, 51 percent of people in Sweden and 52 percent of Danes are considered overweight, while 25 percent of the Icelandic population is classified as obese (Röös et al. 2021; Jensen et al 2022; Ministry of Health 2019). In Norway, some studies show that only 23 percent of men and 42 percent of women have BMI lower or within the normal range (Folkehelse rapporten 2023). In Finland, among young adults under 30, more than 35 percent of women and nearly 50 percent of men are overweight. Among adults over 30, it is 63 percent of women and 72 percent of men that are considered overweight, with 28 percent of women and 26 percent of men being obese (Finnish Institute for Health and Welfare 2024).

In addition, non-communicable diseases such as cardiovascular diseases, diabetes and cancer have also increased for decades (Jørgensen et al. 2010; De Schutter et al. 2020). The increase of these types of diseases is linked to a high intake of salt, sugar, and saturated fat and a low intake of fruit and vegetables (Reisch et al. 2017). As such, unhealthy food consumption patterns contribute to significant problems for public health. Few Nordic citizens meet the recommended intake levels of fruits and vegetables, and many consume insufficient amounts of whole-grain cereals (Harwatt et al. 2022; Lemming and Pitsi 2022).

A healthier diet not only benefits individual health but also aligns with more climate and environmentally sustainable practices (Norwegian National Nutrition Council 2017; Willett et al. 2019). According to an analysis by the Danish Council on Climate Change, the average Dane aged 6-64 years could reduce their climate impact from food consumption by 31-45 percent by following national dietary guidelines, simultaneously benefiting their health (Klimarådet 2021). For the health of the Nordic population and

the well-being of the planet, the need to shift towards more sustainable and healthier diets is undeniable.

Despite these challenges, which are well-researched in the Nordic countries, consumers largely ignore advice on how to mitigate this burden. The latest report on food consumption in Norway shows a concerning trend away from the current Norwegian dietary recommendations and The Norwegian National Action Plan for a Healthier Diet (2017-2023) (Helsedirektoratet 2023; Regjeringen 2017). For instance, there is lower consumption of fruits and vegetables than recommended, and higher consumption of salt, saturated fats, and red meat.

2.1 A closer look at how Nordic diets align with NNR2023

NNR2023 recommends a diet that is predominantly plant-based, rich in vegetables, fruits, berries, pulses, potatoes, and whole grains. Ample amounts of fish and nuts. A moderate intake of low-fat dairy products, and limited intake of red meat, white meat, processed meat, alcohol and processed foods containing high amounts of added fats, salt and sugar (Blomhoff et al. 2023). NNR2023 is primarily designed for national authorities rather than for direct consumer guidance. National authorities utilise the recommendations to formulate national dietary guidelines that are consumer-specific. In NNR2023, advice is presented for different food groups recommending how each food group should be included in Nordic diets based on a strict methodological review of research. In the following we take a closer look at three food groups, and how the Nordic intake aligns with the science advice presented in NNR2023.

The three food groups are: 1) Vegetables, fruits, and berries, 2) Red meat, and 3) Fish and seafood. Data from the latest national dietary surveys in each of the Nordic countries are used and compared with the science advice from NNR2023^[4]. The most recent national dietary surveys in Denmark (2011-2013), Sweden (2010-2011), and Norway (2011) were conducted over a decade ago, whereas Finland's latest survey dates to 2017, and Iceland's to 2022. Nevertheless, supplementary data sources suggest that meat consumption levels are still higher than the recommended intake, while the consumption of vegetables and pulses is too low (FAO 2016; Jordbruksverket 2024).

4. See appendix for data references to the national dietary surveys



Photo: Johannes Jansson/norden.org

2.1.1 Vegetables, fruits, and berries

According to the NNR2023 scientific guidelines, each individual should consume between 500-800 grams, or more, of a variety of vegetables (excluding potatoes and legumes), fruits (excluding fruit juice), and berries daily. Figure 1 illustrates the actual consumption of vegetables, fruits, and berries in comparison to these NNR2023 guidelines.

As depicted, the consumption in all Nordic countries falls below the lower limit of the NNR2023 recommendations, ranging from 200-400 grams per day. The lowest consumption is observed in Iceland, which can be partly attributed to the country's climate. A comparison of the current and previous dietary surveys in Iceland reveals a decrease in the number of people meeting the recommended intake of vegetables, fruits, and berries (Directorate of Health 2022).

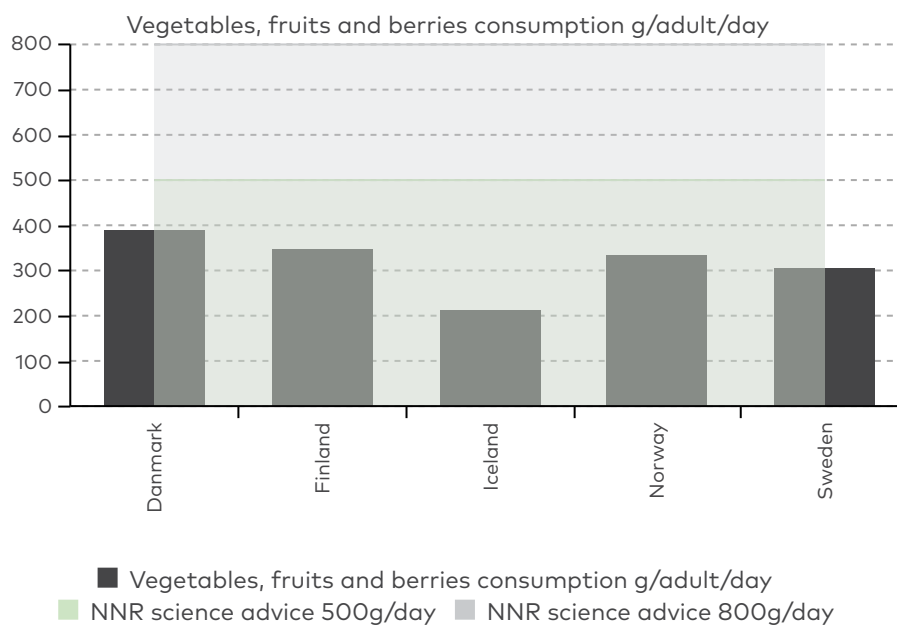


Figure 1 Consumption of vegetables, fruits and berries in each Nordic country compared to NNR2023 science advice.



Photo: Karin Beate Nøsterud/norden.org

2.1.2 Red meat

Scientific guidelines recommend limiting the consumption of red meat, including processed meats, to no more than 350 grams per week (in ready-to-eat weight) due to health concerns, and suggest that for environmental reasons, the intake could be even lower. High consumption of red meat is a significant contributor to greenhouse gas (GHG) emissions from diets in the Nordic and Baltic countries (Röös et al. 2022; Wood et al. 2023). Red meat includes beef, lamb, goat, various game meats (such as moose, deer, and reindeer), and pork. Among these, game is the most environmentally friendly option. NNR2023 also emphasize the importance of ensuring that reducing red meat intake should not lead to increased consumption of white meats (like chicken, hen, turkey, and duck). Instead, it should be replaced with plant-based foods and fish from sustainably managed stocks.

In all Nordic countries, red meat consumption exceeds the recommended maximum of 50 grams per day (Figure 2). Denmark records the highest intake, at 136 grams per day, nearly three times higher than the NNR2023 guidelines suggest. This consumption rate in Denmark is also significantly above the European average (Wendler and Halkier 2023). In Iceland, there has been a 10 percent reduction in red meat consumption, equivalent to 60 grams per week, between surveys conducted in 2010-2011 and 2019-2021. This trend indicates a move in the right direction, but consumption levels remain far above the recommended maximum of 350 grams per week. However, from an environmental perspective, the recommended intake of animal protein should be even lower. Two independent studies, published in the *International Journal of Life Cycle Assessment* and *Nature Communications*, have demonstrated that reducing animal protein intake to around 11-12 percent optimises global land use and enables organic feeding (Muller et al. 2017; van Kernebeek et al. 2016). Currently, in Europe, the consumption of animal protein constitutes 38 percent of dietary protein intake (EEA 2024) indicating a significant discrepancy.

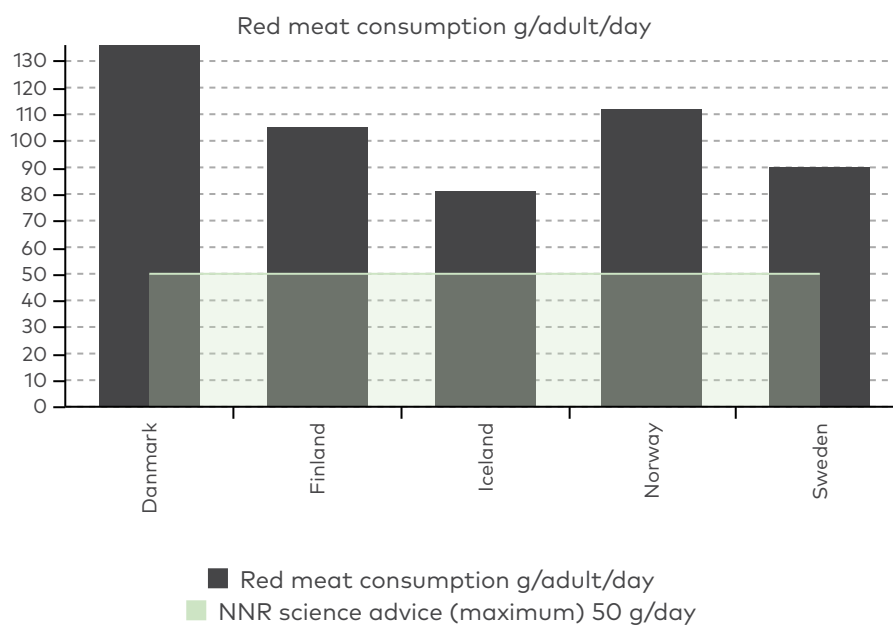


Figure 2 Consumption of red meat in each Nordic country compared to NNR2023 science advice.



Photo: Magnus Fröderberg/norden.org

2.1.3 Fish and seafood

For fish and seafood, the recommended science advice is to consume 300-450 grams per week (ready-to-eat weight). On a daily basis this amounts to 42-64 grams. As illustrated in Figure 3, all the Nordic countries are below the advice with the exception of Norway. The Norwegian Directorate of Health's dietary advice on fish corresponds to a total of 300-450 grams of pure fish per week. At least 200 grams should be fatty fish.

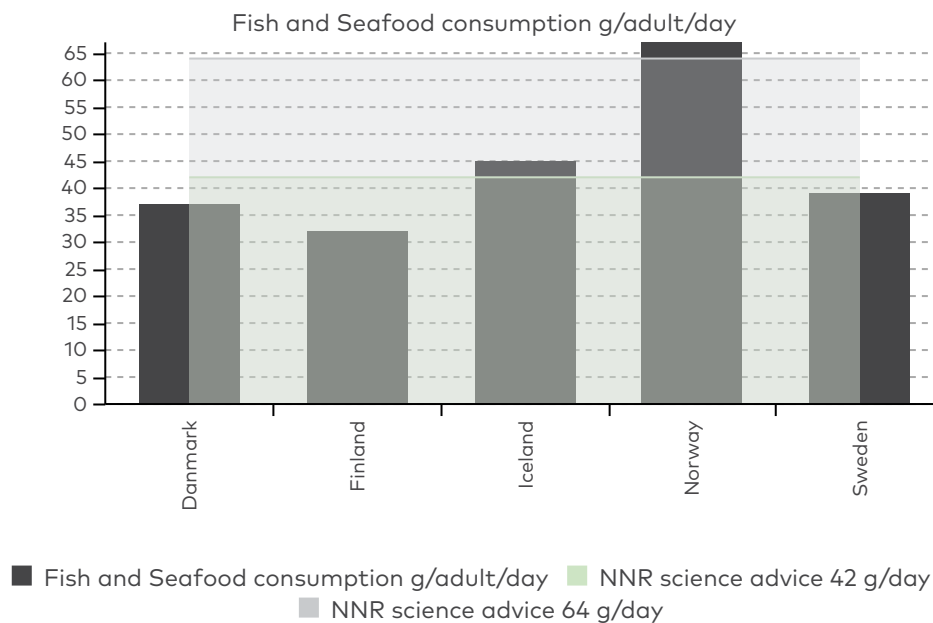


Figure 3 Consumption of fish and seafood in each Nordic country compared to NNR2023 science advice

We can conclude that current Nordic diets significantly diverge from the NNR2023. To bridge this gap, substantial behavioural changes are essential. Currently, many scholars emphasize the importance of understanding the behavioural drivers behind healthy and unhealthy diets (Schutter et al. 2020). Consequently, the next chapter will explore the behavioural determinants in food consumption.

3. From understanding behaviour to facilitating behaviour change

Food behaviour is influenced by a complex interplay of numerous factors. The importance of any specific factor can differ among individuals or groups, and it can vary at different stages of life. Comprehending both the internal and external determinants that influence behaviour, as well as understanding the decision-making processes of individuals or groups, is crucial for designing effective policy measures to encourage dietary change (Atkins and Michie 2015; Leng et al. 2021).

This chapter outlines a **Food Behaviour Framework applied to Nordic conditions** (Figure 4). It serves as a foundational tool for understanding the variety of factors, also known as determinants, that influence individuals' food consumption behaviours. This framework is instrumental in developing the Nordic Food Behaviour Change Framework (Figure 5). The latter is designed to enhance the understanding and implementation of strategies that effectively lead to behavioural change in the context of food consumption in the Nordic countries.

Food behaviour is complex, influenced by a multitude of factors and their interactions. The significance of any particular factor can vary between individuals or groups, and also across different life stages. Understanding the internal and external factors that affect people's behaviour, and comprehending why and how individuals or groups make certain decisions and act accordingly, is crucial for the design of effective policy interventions promoting dietary change (Atkins and Michie 2015; Leng et al. 2021).

Behaviour occurs within constantly evolving systems and contexts (Atkins and Michie 2015). Theories of consumer behaviour suggest that food choices and dietary habit changes are influenced not only by the individual attitudes and motivations of consumers but also by societal norms, as well as economic and cultural factors (Lima et al. 2021). These habits are adaptable, with behavioural changes potentially resulting from shifts in skills, perceptions, and material aspects (Macura et al. 2022). Literature generally distinguishes three types of determinants influencing food consumption behaviour, highlighting the substantial interplay and interdependence among these factors (Contento 2011; Lima et al. 2021; Steenkamp 1993):

- **Food-related determinants** encompass biological preferences and individual experiences with food, such as a penchant for sweet and salty flavours. Sensory and emotional reactions to the taste, smell, appearance, and texture of food considerably influence our food preferences and choices. This category also includes acquired tastes and the capacity to learn to enjoy certain foods.
- **Person-related determinants**, such as an individual's beliefs, values, attitudes, knowledge, skills, and social and cultural norms (intrapersonal determinants), have a significant effect on food choices. Interpersonal factors, involving family, friends, and other social networks, are equally influential. Socio-demographic factors like age and gender, as well as educational level, individual knowledge, and experience, also play a role in influencing food choices.
- **Socio-environmental determinants** affecting food choices include the availability and accessibility of food, which can be influenced by geography. This category encompasses a range of economic, cultural, marketing, and policy factors (Contento 2011; Lima et al. 2021; Steenkamp 1993).

Drawing on Steenkamp (1993) and Contento (2011), this report presents a newly developed Food Behaviour Framework applied to Nordic conditions (Figure 4). We have augmented these theoretical insights with reviews of articles examining the impact of various factors on the implementation of different policy instruments (Ammann et al. 2023; Collier 2022; Fesenfeld 2020).

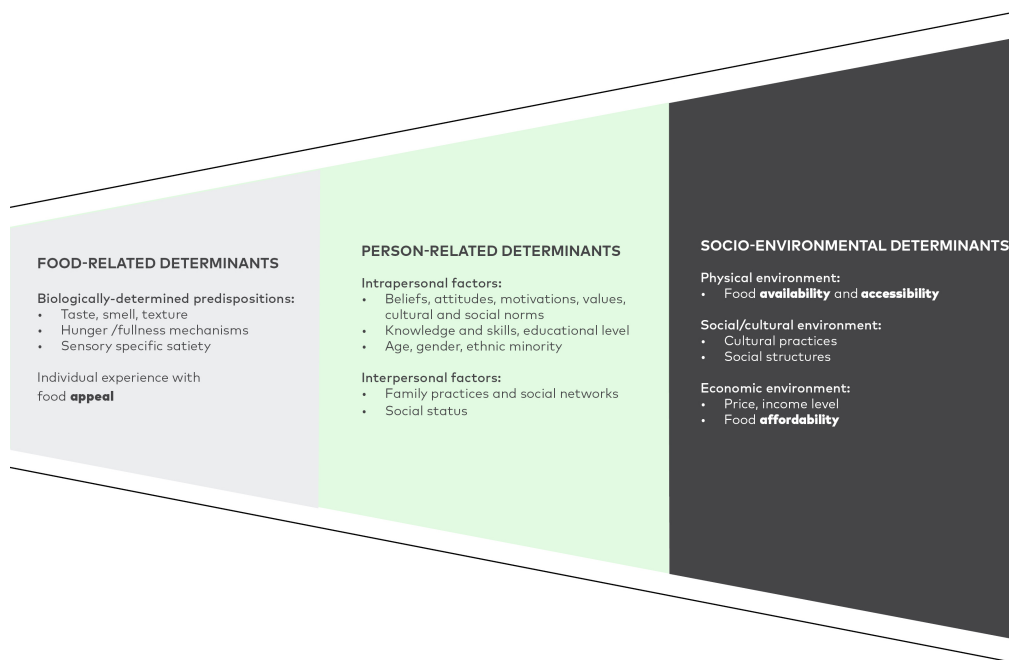


Figure 4 Food Behaviour Framework applied to Nordic conditions: factors influencing food choices and dietary behaviour.

Food-related determinants

Food-related determinants include both biological factors and personal experiences with food. Numerous studies have confirmed that the sensory attributes of food significantly influence food selection. This preference is understandable, as sensory pleasure provides immediate satisfaction, often leading people to prioritise present enjoyment over future health benefits. Consequently, health claims and sustainably produced items, which offer long-term advantages, may not appeal as much to consumers due to their delayed rewards (Amman et al. 2023). Even the most sustainable and healthy food products lose their appeal if they are not palatable.

A preference for certain foods typically develops over time through learned or conditioned preferences. This evolution occurs as consistent consumption of a food, resulting in outcomes like satiety or fullness, reinforces our liking for it. However, early food experiences play a crucial role in setting eating patterns, influencing not only the types of food individuals prefer but also their consumption quantities. Biologically determined preferences for certain foods might be challenging to alter through public policy interventions. Nonetheless, research suggests that early food experiences are critical in shaping lifelong eating habits (Contento 2011; Leng et al. 2016). In this context, exposing children to a variety of foods and fostering a positive social and emotional environment, such as observing the eating habits of peers and adults, can significantly influence food preferences. Hence, public interventions targeting early life

experiences, for example by ensuring easy access to healthy and nutritious foods in kindergartens and schools, are vital. Given the significance of taste, it is equally important to improve the culinary skills of chefs in public kitchens to prepare delicious meals that align with nutritional recommendations.

Person-related determinants

Age is a significant factor influencing food behaviour, with diverse needs and preferences for food depending on one's age. Research suggests that for young adults, factors such as time constraints, price, mood, convenience, and taste preferences are common determinants of eating behaviour. As individuals age, barriers to healthy eating habits, like food costs and social group resistance, tend to diminish (Mediratta and Mathur 2023). However, with ageing, people develop expectations and sentiments about foods shaped by perceptions, attitudes, beliefs, values, emotions, and personal significance attached to different foods, as well as acquired knowledge and skills. Younger people may be more open to adopting new eating habits and trying novel foods, making them receptive to interventions promoting sustainability and health (Contento 2011).

Research reveals varied results regarding how age influences attitudes towards eco-labels and sustainable food products. Some studies indicate that older individuals are more likely to purchase sustainable products and are willing to spend more on sustainability, possibly due to greater financial stability often found in older age groups. Conversely, other research shows that younger consumers are more concerned with environmental and ethical issues and are more inclined to pay extra for certified products. Younger individuals are also generally more open to adopting new practices in their workplace canteens (Ammann et al. 2023).

Gender is another personal factor influencing dietary choices. Research suggests that women may be more health-conscious and more likely to heed dietary advice, potentially making gender-tailored messages more effective (Wardle et al. 2004). Studies also indicate that women are more likely than men to pay extra for products with eco-labels, have more knowledge about sustainability, and express greater concern over sustainability issues. Regarding men, studies suggest they are more inclined to choose eco-labelled products if they are cost-effective. Consequently, this suggests they might be willing to pay more for products with a reduced carbon footprint (Ammann et al. 2023; Sand 2022).

Family structure, particularly during childhood and adolescence, plays a critical role in shaping dietary preferences, with active family involvement being essential in establishing early dietary habits (Duralia 2023; Scaglioni et al. 2018). Open communication with parents about nutrition and shared meals positively influences the development of healthy food habits among children (Haines et al. 2019). Additionally, the eating behaviour of older adults is influenced by their social status. A study on

Dutch older adults living alone revealed that individual (i.e., habits) and financial (i.e., food accessibility) factors are among the most influential factors affecting their eating behaviour (Bukman et al. 2020).

Research has highlighted spatial disparities in dietary choices and food preferences, indicating that areas with a higher proportion of well-educated residents typically display a more diverse range of nutritional choices and a tendency towards reduced caloric consumption. In contrast, communities with lower educational levels tend to have a higher prevalence of sweets and sugar-rich products (Azizi Fard et al. 2021). One could also assume that higher levels of education correlate with higher income levels. The study by Azizi Fard et al. (2021) suggests that **educational background** significantly influences the dietary patterns and food choices of different communities. Moreover, higher levels of education are associated with increased awareness of nutrition and understanding of health information (Azizi Fard et al. 2021), as well as sustainability issues, and a greater willingness to purchase products with sustainability labelling (Amman et al. 2023).

In a German context, a study by Perino and Schwickert (2023) found that **personal values**, such as considerations regarding animal welfare, significantly influence public support for meat taxation. Another study in Sweden shows that political ideology plays a role in the level of acceptance of a climate tax on beef (Harring 2020). Moreover, dietary choices are deeply intertwined with social norms. To achieve a substantial shift in consumption patterns, it is essential to bring about changes in these norms (Röös et al. 2021).

Socio-environmental determinants

Social and environmental factors play a significant role in influencing our food choices. These factors are often more amenable to change compared to food- and person-related factors, as they encompass broader, external aspects of our lives that can be modified through targeted policy instruments (Lima et al. 2021).

Research shows that the environments where individuals form their dietary behaviours and make food choices significantly impact their eating habits (Hawkes et al. 2013). Studies have demonstrated that **the presence of healthier options in local grocery stores** correlates with greater availability of these foods at home. Consequently, the variety of food options in a community or neighbourhood directly affects purchasing and consumption habits (Contento 2011; Hawkes et al. 2013). The availability of food in areas surrounding workplaces and schools also influences the dietary habits of both children and adults (Contento 2011). Furthermore, place of residence impacts attitudes towards policies like a climate tax on beef, with individuals in rural areas of Sweden being more opposed to it (65 percent) compared to those in large urban areas (37 percent) (Harring 2020). This finding underscores the need to consider neighbourhood-specific factors and the particular social environment when developing public health

policies and interventions to ensure their effectiveness and extensive reach (Azizi Fard et al. 2021; Bukman et al. 2020).

Personal income levels and the prices of food items are known to influence the quantity and type of food that consumers purchase (Capacci et al. 2012; Lima et al. 2021; Steenkamp 1993). Research indicates that the prevalence of obesity in both men and women decreases with higher socioeconomic status, whereas interest in nutritional information, particularly about fat content, increases with social class (Leng et al. 2016; Steenkamp 1993). Individuals with lower income or education levels tend to prioritize price and familiarity over health when selecting food. Since the cost of food often correlates with its nutritional quality — where lower-priced products tend to be nutritionally inferior and energy-dense — it can be more challenging for individuals with lower income to prioritize health in their food purchasing decisions (Konttinen et al. 2012). Research shows that offering price discounts on healthier food options leads to an increase in their purchase across all education and income levels (Blakely et al. 2011). This suggests that making healthier foods more affordable can effectively encourage a wider range of people to choose these options, regardless of their socioeconomic status.

Research further shows that individuals with higher incomes are more likely to buy products with eco-labels and consider animal welfare. This trend is often attributed to the greater financial flexibility of high-income households. Studies have found that these consumers are willing to pay more for sustainable products, although the extent of this price premium varies across different food categories. However, these studies often rely on stated preference methods, leading to varied results that are challenging to compare. Furthermore, there is often a gap between what consumers claim they value (as evidenced in stated preference studies or their declared willingness to pay) and their actual purchasing behaviour, especially regarding social, ethical, or environmental considerations (Amman et al. 2023).

Cultural practices and family background are important determinants of food choices and eating habits, even in contemporary and multi-ethnic societies with a wide array of culinary options (Contento 2011; Duralia 2023). These cultural norms are evident across various cultures, including restrictions on certain foods that may carry religious or symbolic significance (Duralia 2023). However, the impact of perceived descriptive norms – what people think others are doing – is less influential compared to other factors like habitual choices, the visual appeal of food, its value for money, and satiety levels (Salmivara 2021).

The Nordic Behaviour Change Framework for Better Diets

This report enhances the Food Framework applied to Nordic conditions (Figure 4) by also developing the Nordic Behaviour Change Framework (Figure 5). It offers a comprehensive analysis of the factors that influence individual food consumption behaviours and outlines strategies designed to support behavioural shifts. The objective of this framework is to steer and inform the formulation of policy interventions that effectively encourage healthier and more sustainable dietary habits (Atkins and Michie 2013).

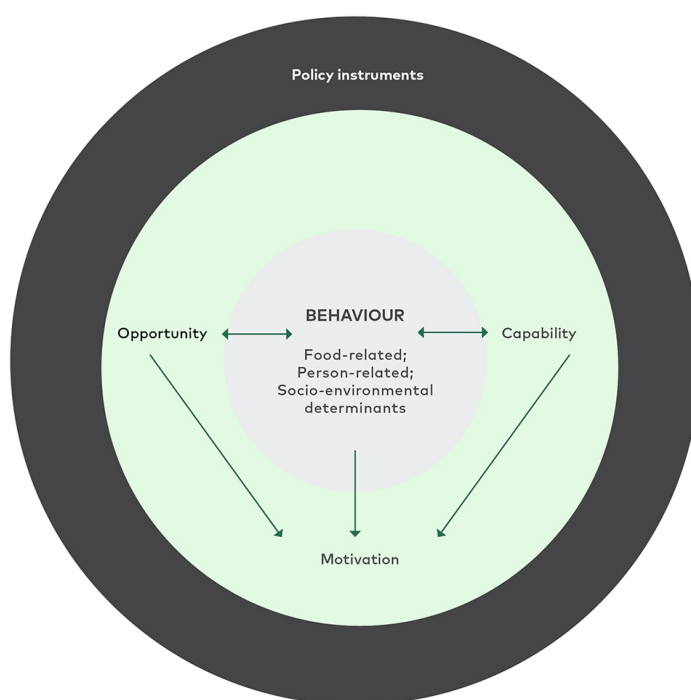


Figure 5 The Nordic Behaviour Change Framework for Better Diets

In Figure 5, the innermost circle pertains to factors influencing individual choice, the middle circle covers components that help explain behavioural influences, and the outermost circle refers to enablers, specifically policy instruments, that can give incentives for behavioural change. See chapter 4 for examples of specific policy instruments.

The Nordic Behaviour Change Framework is predicated on the understanding that food policies and interventions aimed at promoting better diets should focus on enhancing the

availability, affordability, accessibility, and appeal of healthy dietary options, while simultaneously reducing these factors for unhealthy diets (Hawkes et al. 2013). These '4 A's' elucidate behavioural influences and are closely associated with the concept of opportunity, as described below. Availability refers to the physical presence of food within the local area. Affordability denotes the ability to purchase food at a reasonable price. Accessibility concerns the ease with which food can be obtained and is impacted by factors such as transportation (Leng et al. 2016). Appeal relates to the qualities of food that make it attractive or desirable to individuals, for example, taste and ease of preparation.

The 'COM-B' model, as detailed by Atkins and Michie (2013) provides a framework for understanding and influencing behavioural change. It posits that for a behaviour to occur, individuals must have both the physical and psychological capability (C) to perform it, the right physical and social opportunities (O), and the motivation (M) to engage in this behaviour (B). Therefore, it is essential that individuals understand how to perform the behaviour, comprehend its importance, and possess the necessary skills to facilitate change. According to this model, three core components are essential for any behaviour to occur (Atkins and Michie 2013):

Capability: This involves the individual's ability to engage in the desired behaviour, encompassing physical skills and abilities as well as psychological aspects like knowledge and understanding of how and why to perform the behaviour. To facilitate change, individuals must be equipped with the necessary skills and clear instructions.

Opportunity: This pertains to the external environment that enables the behaviour, including factors such as the availability of resources, time, and the physical environment, as well as social opportunity like social norms, cultural practices, and the influence of others in an individual's social circle. The behaviour is more likely to be adopted if it is perceived as normal within their peer group.

Motivation: This involves the drive to engage in the behaviour over other competing actions, influenced by habitual processes, emotional responses, and analytical decision-making. Individuals must believe that the behaviour is worthwhile and important enough to prioritise over other activities.

To facilitate behavioural change towards healthier and sustainable diets, a variety of policy instruments can be employed to enhance the capability, opportunity, and motivation of individuals to choose better diets. These strategies vary, ranging from altering the food environment through instruments like labelling and creating a healthy retail environment, to restricting food advertising and directly targeting individuals (Hawkes et al. 2013). The challenge in altering health-related behaviours lies not only in enhancing people's motivations to eat healthier through policy instruments and interventions but also in bridging the gap between these intentions and actual behaviour. Effectively addressing this intention-behaviour gap is crucial for successful behaviour change (Broers et al. 2017). Different policy instruments giving the incentive to change behaviour towards healthier and more sustainable diets will be discussed in more detail in the next chapter.

4. Policy instruments for changing eating habits

This chapter provides an overview of policy instruments designed to give the right incentive to people for changing their behaviour towards healthier and more sustainable diets.

Policy instruments can generally be categorised into instruments that encourage specific behaviours among consumers and those that directly aim to influence people's actions (Banerjee et al. 2021). In principle, most initiatives driving behavioural change are policy-driven, but as revealed in the literature review, certain approaches yield better results than others. Factors outlined in the *Nordic Food Behaviour Framework* such as consumer demand, the availability, affordability, and accessibility of healthy and sustainable food products, as well as sociodemographic characteristics like gender and education level, are considered essential for promoting dietary shifts.

The review in this chapter is based on existing studies of policy instruments aimed at promoting more environmentally sustainable (e.g. Ammann et al. 2022; Rööß et al. 2021) and healthier diets (e.g. Livsmedelsverket 2022). Four categories of policy instruments have been identified: market-based, regulatory, nudging and information-based (Ammann et al. 2022). These instruments range from having a greater intrusiveness (market-based and regulatory) to a less intrusive character (nudging and information-based) (Banerjee et al. 2021). In brief, the four categories can be described as follows:

- **Market-based instruments** affect food prices through taxes and subsidies, serving as effective measures to influence consumer behaviour by altering relative price structures. By introducing taxes on less sustainable and unhealthy food products while providing subsidies for environmentally friendly and nutritious alternatives, these instruments aim to incentivize consumers towards making healthier and more sustainable choices (Critchley and Unwin 2010; Culliford and Bradbury 2020; De Schutter et al. 2020).
- **Regulatory instruments** involve bans or limits and are considered the most intrusive policy measures, as they restrict the range of products available to consumers. These measures can be implemented to address specific health or environmental concerns, ensuring a controlled marketplace. While effective in directly shaping consumer choices, regulatory instruments can also spark debates

regarding individual freedoms and the role of government intervention in personal decision-making (Hatløy et al. 2021).

- **Nudging instruments** comprise measures that subconsciously guide consumers toward making specific choices. These may also encompass conscious interventions such as introducing more legumes in the meals in public institutions and working with product choice architecture (i.e., the environment in which people make decisions). This includes aspects like product design, portion sizes, placement, priming, and presentation (Bucher et al. 2016; Coucke et al. 2019; de Vaan et al. 2019; Friis et al. 2017; Gynell et al. 2022).
- **Information-based instruments** encompass tools designed to enhance individuals' knowledge, raise awareness and competence, and support consumers in changing their dietary habits. These instruments are among the least intrusive and include methods such as on-package labelling, educational interventions, information campaigns and dietary guidelines (Ammann et al. 2022; Rös et al. 2021). Information-based instruments are widely implemented due to their minimal intrusiveness and generally higher public acceptance (Banerjee et al. 2021; Macura et al. 2022). Consumer interest and the relevance of the topic to consumers are major factors influencing the effectiveness of information-based instruments (Ammann et al. 2022; Rös et al. 2021).

The next section provides an overview of the identified policy instruments broken down by category.

4.1 Market-based instruments

Fiscal measures, known as market-based instruments, are designed to influence the consumption patterns of various food products, as discussed by Rös et al. (2021). These instruments include specific taxes, subsidies, or changes in fees/charges (adjustments in VAT), strategically implemented to modify the relative prices of certain foods. The goal is to make healthier and more environmentally sustainable options more affordable compared to unhealthy choices. This approach is intended to align prices more closely with the true societal and environmental costs, as highlighted in studies by Macura et al. (2022), Perino and Schwickert (2023), Kihlberg (2021), and Säll and Gren (2015). Generally, taxes on goods and services tend to increase consumer prices, whereas subsidies have the opposite effect, leading to lower prices for consumers, a point reiterated by Rös et al. (2021).

Subsidies are financial mechanisms that should be strategically deployed to encourage positive externalities, such as biodiversity enhancement through farmland pollination

or advancements in education and research, rather than to mitigate negative externalities. Negative externalities, such as carbon emissions contributing to climate change or nutrient emissions from agriculture causing eutrophication, should be addressed through 'sticks' (punishment)—either economic instruments like taxes and fees or legal measures including bans, tailored to the specific characteristics of the externality in question. Positive externalities, on the other hand, justify the use of subsidies 'carrots' (reward), as seen in the support for childcare and schools, which promote societal benefits. However, misapplication of subsidies to negative externalities, such as the substantial support given to agriculture despite its significant role in nitrogen emissions leading to water eutrophication, represents poor governance. This approach not only exacerbates the problem but also traps us in a cycle of funding compensatory actions indefinitely, as exemplified by the EU's Common Agricultural Policy (CAP) subsidies. This dichotomy between positive and negative externalities, and the appropriate use of subsidies, is crucial for effective policy-making and governance (Indeed 2024).

Taxes on food products

The practice of taxing unhealthy products like tobacco, alcohol, or sugar is not a recent development. Traditionally, these taxes have primarily served fiscal purposes, namely generating revenue to fund public expenditures. Their use to encourage specific behaviours, such as healthy eating habits, is a relatively new development (Jensen and Smed 2017). In 2010, the Danish government increased taxes by 25 percent on a range of products based on sugar content (including ice cream, chocolate, sweets, and soft drinks) and decreased taxes on sugar-free soft drinks (Ecorys 2014, Capacci et al. 2012). In 2013, Denmark chose to abolish both the soft drink tax and the recently implemented fat tax, which had been in place from 2011 to 2012 (Capacci et al. 2012).

In recent years, a substantial number of modelling and experimental studies have been carried out to explore the impact of fiscal policies on potential consumption and health outcomes (Jensen and Smed 2017). These studies typically focus on price elasticity and consumer reactions to changes in relative prices – looking at how much the demand for product changes in response to a price change (Capacci et al. 2012). Research indicates (in combined analyses) that a 10 percent tax on sugar-sweetened beverages is associated with an average decrease in demand of 5 to 10 percent (Afshin et al. 2017; Green et al. 2013; Teng et al. 2020). This suggests that fiscal measures like taxation can be effective in reducing the consumption of unhealthy and environmentally unsustainable foods, as higher prices generally discourage the purchase of taxed items (Perino and Schwickert 2023; Säll and Gren 2015; Vellinga et al. 2022). Some researchers suggest that modest tax rates may not lead to significant changes in consumption but can generate significant tax revenues. These revenues could be used to finance alternative health and nutrition initiatives (Capacci et al. 2012).

The degree to which changes in consumption due to a food tax impacts the consumption of foods and public health improvements remains a topic of debate. Academic literature on this subject is often inconclusive and at times presents contradictory evidence (Ecorys 2014). The varied outcomes of studies on this topic are primarily due to uncertainties related to the scale of substitution effects and the challenges in precisely determining demand responses to food taxes. These challenges stem from the complexities in directly linking tax changes to shifts in prices and demand. Moreover, external factors such as the cost of raw materials also play a significant role in influencing both price and demand, adding to the complexity of these assessments. In Finland, for example, where during the reintroduction of the sweet tax, rising costs of sugar and milk were also factors affecting the prices of confectionery and ice cream (Ecorys 2014).

Regarding substitution effects, when there is a decrease in demand due to taxes, consumers might either switch to less expensive brands of the taxed product (brand substitution) or choose different, untaxed products (product substitution) (Ecorys 2014). An example of this is seen in the case of carbonated soft drinks, where taxation may prompt consumers to turn to alternatives like high-sugar energy drinks and flavoured waters, or to diet versions of the soft drinks. A potential solution to address this issue is to apply taxes or subsidies to a range of food products simultaneously, such as including substitute beverages in the taxation scheme (Smed et al. 2007).

When there are readily available alternatives that are taxed less or not taxed at all, product substitution tends to occur. A positive example of this is the Danish tax on saturated fat which resulted in decreased consumption of taxed products and an increased use of less taxed alternatives like olive oil and vegetable oil, which was the desired effect (Ecorys 2014). This tendency to substitute also depends on the consumers' adaptability, which can differ based on various factors including age, family structure, and educational level (Jensen and Smed 2017).

A Norwegian study modelling use of taxes and subsidies concluded that this would work well for some food groups, but that a shopping leakage across borders (i.e. to Sweden with lower food prices) would reduce effectiveness of taxes and compromise food security (Abadie et al. 2016).

Research focusing on the impact of taxes on saturated fats, fibre, and sugar across different societal segments reveals that these effects are more significant among low-income groups than in other segments of the population, due to their lower price elasticity (Gren et al. 2021; Klenert et al. 2022; Smed et al. 2007). Although food taxes might lead to regressive financial impacts, disproportionately impacting poorer households, their health benefits are anticipated to be progressive. This means that lower-income families are more likely to alter their diets in response to fiscal measures (Capacci et al. 2012; Jensen and Smed 2017). Regarding age demographics, young people tend to decrease their consumption of saturated fats as prices rise, while middle-aged individuals show a higher sensitivity to price changes in their sugar

consumption. This was highlighted in a simulation study examining the effects of sugar and fat taxes and fibre subsidies in Denmark (Smed et al. 2007).

The Danish Council on Climate Change recommends that the Danish Government implements a consumer tax on foods with a high carbon footprint such as meat and dairy products. This tax should reflect the climate impact of different products (Klimarådet 2021). In Norway, the introduction of cost-effective taxes on red meat was among the instruments proposed by the Norwegian Green Tax Commission in 2015 (NOU 2015). In both cases, these proposals have sparked public debate, but they have not resulted in implementation. The attempts to introduce, adapt, abolish, and reintroduce taxes as a fiscal measure in the last 30-40 years in the Nordic countries demonstrate some ambiguity. As the example from Denmark taxing saturated fat illustrates (Box 1), there are numerous representatives from the food industry, who are not convinced of the unequivocal support for taxes in promoting health benefits for citizens.

Danish tax on saturated fat

According to Jensen and Smed (2017), the saturated fat tax in Denmark met the government's revenue expectations and even led to a decrease in saturated fat consumption. However, it was abolished as part of the Danish Parliament's 2013 fiscal budget agreement, likely due to pressure from various stakeholders in Danish society. Representatives from the food industry and nutrition researchers argued that it had a negative impact on the economy and did not positively affect health. The rationale for repealing the tax was to stimulate job creation, reduce cross-border shopping, and support the local economy (Jensen and Smed 2017).

Following the abolition of the tax, consumption levels of higher-fat products did not revert to the pre-tax levels observed before 2013. The evaluation shows that, given the tax aimed to decrease the consumption of products high in saturated fat, it appears to have been effective in achieving this goal, leading to the conclusion that the fat tax was successful (Ecorys 2014).

Box 1 Danish Example, tax on saturated fat

Internal municipal tax

A tax can also be placed internally in an organisation. In 2022, Aarhus Municipality in Denmark implemented an internal climate tax on their procurement of high CO₂ emitting food items. The tax applies to beef, lamb, and ready meals containing meat as well as juice and sugar-sweetened beverages, which collectively contribute to one-third of the municipality's food consumption-related CO₂ emissions. When introduced, the tax amounted to DKK 850 per emitted ton of CO₂. In 2023, it increased to DKK 1000 per ton CO₂, and is scheduled to rise to DKK 1500 by 2030. The tax is levied during procurement and has a direct economic impact on the institution. Its primary goal is to influence staff behaviour by encouraging the substitution of high climate impact products with more sustainable alternatives (Aarhus municipality 2022; Bager 2022).

Subsidies on food products

Subsidies on food products result in a reduction in consumer prices. A study examining the acceptance of taxes and subsidies aimed at promoting more sustainable food consumption among Swedish consumers revealed that acceptance was significantly higher when consumers were presented with subsidies in the form of a value added tax (VAT) removal on plant-based protein, compared to a direct tax increase on meat products. Nevertheless, the level of acceptance for these policies depends on how the subsidy is funded (Lindahl 2023).

Though limited research exists on how subsidies might encourage consumers to make healthier (Capacci et al. 2012) and more environmentally friendly food choices (Röös et al. 2021), a few studies and examples are known from the Nordic Region. In a Danish intervention study, where the 20 percent VAT was removed from fruit and vegetables, a noticeable beneficial impact was found on the sale of fruit and vegetables. The revenue and sale increased by almost 25 percent (Mikkelsen et al. 2021). A survey conducted by Madkulturen in Denmark in 2019 supports this finding, as the surveyed group report that a decrease in vegetable prices would be necessary to boost their consumption (Madkulturen 2019). In Norway, a market-driven price reduction campaign on fish by supermarket chains in the autumn of 2023 has shown a marked increase in actual fish consumption (NRK 2023). These examples indicate that subsidies contribute to increased sales and consumption of the food items Nordic citizens should consume more of. How it affects the diet overall and how it affects sale of other food items need to be further explored.

Typically, interventions via policy instruments that promote healthy behaviours are found to have a greater impact than those aimed at stopping unhealthy behaviours (Afshin et al. 2017). Research indicates that consumers are more responsive to positive incentives such as subsidies (Afshin et al. 2017; Lindahl 2023). In combined analyses, a 10% reduction in prices (i.e., subsidies) led to a 12 percent increase in the consumption of healthy foods, outperforming the results achieved by price increases (i.e., taxes) on

unhealthy products. Afshin et al. (2017) conclude in their study that the application of subsidies, particularly when part of comprehensive, multi-component strategies (i.e. including tailored combinations of taxes and subsidies on particular food items) is an effective method for increasing the consumption of healthy foods. It is important to note that the most suitable and cost-effective policy instrument depends on the problem to be solved. Making comparisons, such as evaluating transaction costs, effectiveness, distributional effects, and so on, is essential to determine which policy instrument is the most cost-effective choice.

A possibility could be implementing a bonus-malus system that adjusts VAT according to the environmental footprint of various products (Röös et al. 2021: 31). This approach would entail imposing higher VAT on animal-based food products and those sourced from tropical, deforested areas, while reducing VAT on fruits and vegetables originating from the Nordic countries and Europe. Another proposal involves applying lower VAT on Keyhole-labelled food and higher VAT on other foods, thus providing an economic reward for selecting more sustainable and healthier options and imposing an economic penalty for less sustainable choices.

Subsidies for companies and organisations

Subsidies may be directed towards companies and organisations to support innovation and development in the food sector. In Denmark, a national fund has been established to support projects that spur development in the plant-based food sector, known as 'The Fund for Plant-Based Food' (Plantefonden). Placed under the Danish Agricultural Agency, DKK 675 million has been allocated toward 2030. In 2023, the fund's focus is on increasing the demand for plant-based foods, hence prioritizing projects that contribute to a more plant-based food culture. Three concrete target areas are outlined: 1) increasing the share of plant-based food in public and private canteens and food services, 2) increasing Danish private consumption of plant-based food, and 3) boosting demand for Danish plant-based food abroad. Initiatives that can be funded include upskilling of kitchen staff, development of educational materials for schools, public kitchens, etc., as well as campaigns and nudging strategies in retail (Landbrugsstyrelsen 2023).

4.2 Regulatory instruments

The second category of policy instruments comprises regulatory measures including laws and regulations, often also referred to as administrative or legal instruments. These can include bans or limitation, regulating in-store availability, marketing strategies, and setting criteria for food served in public institutions through procurement policies or by introducing rationing systems for certain items. It may also encompass partnership agreements with public and private actors working in the food industry (see box 2). Through these means, governments can influence the decision-making of consumers and other actors in the food system (Macura et al. 2022).

Regulatory strategies and measures have proven effective in various instances. For example, they have been instrumental in reducing the levels of unhealthy fats in Danish food (Leth et al. 2006) and prohibiting the sale of alcohol and energy drinks to minors (Gorski and Roberto 2015).

However, these instruments are often considered the most intrusive, as they limit the availability of products to consumers (Ammann et al. 2023). The direct intrusiveness of regulatory instruments on citizens can vary widely, from regulating packaging and portion sizes to outright bans on specific items. Generally, regulatory policy instruments are less socially accepted compared to less intrusive methods, such as information campaigns. This lower acceptance is likely due to their impact on individual freedom of choice. Notably, regulations that target children's access to unhealthy food and beverages tend to be more widely accepted (Kwon et al. 2019, as cited in Rööß et al. 2021: 35).

Governments have at their disposal a range of regulations and requirements to manage the availability and accessibility of unhealthy and unsustainable food products. These include regulating in-store availability, marketing strategies, and setting criteria for food served in public institutions through procurement policies or by introducing rationing systems for certain items. It may also encompass partnership agreements with public and private actors working in the food industry (see box 2).

A regulatory approach to partnership agreements

A Norwegian example of a regulatory approach towards food-related determinants is the partnership for healthier foods instituted by the Norwegian government. In this cooperation agreement between the Health Authorities and the food industry, the food industry cooperates with the Government to facilitate a healthier diet through reformulation of food products and promotion of healthier foods (Helsedirektoratet 2019).

Box 2 An example of a regulatory approach.

For this report, we focus on three types of regulatory policy instruments:

- regulation of consumer choice
- regulation of marketing
- new types of regulatory instruments (e.g. public procurement).

Some of these instruments are already in use within the food sector, while others represent potential regulatory measures adapted from other sectors.

Regulation of consumer choice

Regulatory instruments designed to influence consumer choices in food purchasing include initiatives to reduce packaging or portion sizes of food products, aiming e.g. to curb the consumption of unhealthy or unsustainable food. Regulations also dictate the placement of food items within stores, such as restricting the display of unhealthy products near checkout counters or controlling the availability of products high in sugar, salt, saturated fat, and those with significant environmental impacts.

An illustration of regulated consumer choices in the Nordic region relates to the sale of alcoholic beverages. In most Nordic countries, except for Denmark, alcohol sales are managed through government monopoly systems. Beverages with alcohol content above a certain threshold are sold exclusively in specific stores with restricted

operating hours. To date, there are no similar systems in the Nordic countries that limit the availability of unhealthy or unsustainable food in a similar manner.

Regulation of marketing

Regulatory measures can impose restrictions on the marketing and advertising of specific food and beverage categories. While the Nordic countries enforce marketing restrictions on tobacco, similar controls on the use of public funds for advertising particular food groups could also be explored. In the EU countries, national and EU funds are annually designated to promote various types of food, with the animal-based food sector receiving a substantially larger allocation than the plant-based sector. In Denmark, for instance, approximately DKK 25 million from national funds were directed to the animal-based sector, in contrast to around DKK 5 million for the plant-based sector in 2021 (Klimarådet 2021:56). The Danish Council on Climate Change has criticized such campaigns for animal-based foods, arguing that they are at odds with the national dietary guidelines and the objective of transitioning to more sustainable diets.

In Norway, various food industries such as meat and eggs, dairy, fruits and vegetables, bread and cereals, and seafood, are supported by information offices funded by the industry itself. These offices are dedicated to offering factual information that promotes their specific food groups, along with providing recipes and other related content. Considering the goal of encouraging shifts towards more sustainable and healthier diets, a reassessment of how public funds are allocated for the promotion of certain foods might prove beneficial.

Regulation of public procurement and food served in public kitchens

The public sector can significantly impact as a role model and pioneer in changing food-related behaviours (Reisch et al. 2017; Rööf et al. 2021). This role involves acquainting people with new tastes and flavours, dispelling prejudices associated with consuming sustainable food, and providing inspiration and knowledge for preparing sustainable meals at home. Public kitchens are particularly vital as a large segment of the population occasionally dines in these establishments (Klimarådet 2021). In Finland, the impact of public food service is particularly notable. All children are entitled to a free school meal daily and a subsidized meal in kindergarten (Finnish National Agency for Education 2024). Additionally, approximately half of the workforce has access to subsidized lunches at worksite canteens.

Organic conversion in food environments, such as a canteen at a workplace, is feasible with proper planning, monitoring, education, information and communication,

stakeholder involvement, and experience sharing (Mikkelsen et al. 2020). Several Nordic cities have introduced various strategies and regulations to increase the consumption of sustainable and healthy foods (see box 3).

Past experiences in transforming public meals indicate that it is crucial to combine regulatory instruments with other instruments (Mikkelsen et al. 2021). Efforts include education and upskilling of kitchen staff and public procurers, support from local politicians for sustainable food in public kitchens attention to rhetorical and aesthetic aspects of meal presentation (Attwood et al. 2020) and communication efforts to explain the reasons behind meal changes (Röös et al. 2021).

Among market-level policies, those regulating school environments are most common. An example at the EU level is the EU School Fruit Scheme introduced in 2009, with the European Commission subsidizing the provision of free fruits and vegetables in schools. Regulatory measures impacting meals show a positive effect on behaviour, typically in the short term. However, evaluations are often limited, focusing solely on behavioural changes at the intervention site (e.g., vending machine sales in schools) and overlooking any compensatory behaviours that might occur outside the school environment (Capacci et al. 2012).

Copenhagen

In 2019, Copenhagen Municipality launched a food strategy aimed at reducing the climate impact of public meals by 25 percent from 2018 to 2025, while ensuring that these meals remain healthy and nutritious. This strategy builds on previous efforts to increase organic food in public kitchens. Key aspects of their approach include motivating and educating kitchen staff to prepare sustainable, healthy, and tasty meals, developing recipes for public kitchens, and establishing guidelines for menu planning (Klimarådet 2021; Lassen et al. 2021).

The Danish Council on Climate Change has proposed that public kitchens should adhere to the national dietary guidelines. This would help mitigate climate impact, ensure the provision of healthy meals, and aid in normalising a more sustainable diet. They suggest that if the primary goal of public kitchens is to serve more sustainable food, the national dietary guidelines should be used as they also guarantee healthy and nutritious food, an aspect not covered by sustainable food evaluation based on Life Cycle Assessment (LCA) analysis (ibid).

Oslo

In 2022, Oslo's local government introduced regulations stating that all meals served at public events should be vegetarian by default, as part of a broader sustainability strategy (Oslo Kommune 2024). Meals served in public institutions are required to follow official nutrition guidelines and be predominantly plant-based (Oslo Kommune 2023). These regulations form part of Oslo's strategy to reduce climate gas emissions by 95 percent by 2030 (Oslo kommune 2024).

Box 4 Two Nordic examples

Menu restrictions are proposed as another regulatory instrument that public kitchens can introduce (Röös et al. 2021). Such restrictions could focus on replacing entire meals (for example, with vegetarian alternatives) or changing the quantities of food ingredients with a high climate impact in the existing recipes (for example, replacing a portion of the meat with pulses and legumes). In such cases, communication efforts and attention to rhetorical aspects are important, as changes in public meals have shown to be sensitive and contested.

New types of regulatory Instruments

One potential regulatory instrument that could be considered is a rationing system for meat consumption, inspired by the emissions trading system (Röös et al. 2021). This system would set limits on the amount of meat sold or consumed, aiming to reduce environmental impact and promote public health. Currently, rationing is not employed as a policy instrument in the Nordic countries and is primarily associated with situations such as wartime or food shortages within this region.

Another potential instrument involves the gradual increase of sustainability requirements for food sold in the retail sector. This could be achieved through methods like targeted advertising, in-store displays, choice editing, pricing adjustments, and enforcement of more stringent regulations regarding the sourcing, packaging, and distribution of food items. Retailers might be required to procure a higher percentage of their products from sustainable and ethical suppliers, reduce the use of non-recyclable packaging materials, or implement energy-efficient practices in their operations. These requirements would not only encourage more environmentally friendly practices in the retail sector but also raise consumer awareness and demand for sustainable products. Consequently, this could result in broader shifts in consumer behaviour and market dynamics. Both regulatory approaches would necessitate collaboration and dialogue with stakeholders in the private sector to ensure feasibility and effectiveness, while also balancing economic and environmental considerations (European Commission 2020b).

4.3 Nudging

Nudging instruments encompass a wide range of strategies aimed at subtly influencing behaviour to achieve specific objectives, such as promoting healthier or more sustainable lifestyles. Studies indicate that over half of the decisions consumers make about grocery purchases are spontaneous and are made in the store. This makes customers vulnerable to environmental factors that often lead to less healthy food consumption. For instance, restaurants offering large portion sizes can subtly shift consumption norms towards overeating. Similarly, supermarkets strategically placing sugary drinks at prominent end cap locations and candies in checkout aisles increase the visibility and temptation of these items, thereby boosting impulse buys (Gorski and Roberto 2015).

Nudging instruments, which is an informative type of policy instrument, can be effective tools to address these challenges. These instruments draw upon insights into human behaviour to design scenarios that encourage specific actions, either

consciously or unconsciously (Karevold et al 2017; Rööß et al. 2022). Nudging instruments can be used in different settings as for example in supermarkets and restaurants. One prevalent nudging tool in restaurants is the use of a "default choice" such as designating a vegetarian dish as the "lunch special". Many restaurants tend to opt for this selection, eliminating the need for an active decision-making process. Other commonly employed nudging techniques include altering the sequence in which dishes appear on the menu and on the buffet line or reducing plate sizes to minimize food waste. In supermarkets, strategically placing products can effectively steer consumer behaviour towards healthier and more eco-friendly choices. Many public institutions and canteens, such as those in the City of Oslo (see box 4), incorporate vegetarian meal alternatives into their practices.

Conscious nudging strategies also exist, directly appealing to consumers' values and offering feedback to reinforce environmentally sustainable consumption habits. Several supermarkets and food retailers have, as part of their sustainability strategy, implemented rewards for consumers who make environmentally sustainable and healthy food choices. One example is the initiative "Mitt klimatmål" by the Swedish grocery store ICA rewards customers for making more eco-friendly choices (Rööß et al. 2021).

There is growing empirical evidence suggesting that nudges and choice architecture, which involve structuring the presentation of choices to influence decision-making, have substantial potential for positive environmental and health-related impacts, and they can be both effective and cost-efficient (Reisch et al. 2021). Furthermore, nudges are becoming a popular option for policymakers, largely because of their widespread public acceptance, especially as there is increasing pressure to act (Sunstein and Reisch 2019). For an illustration of nudging strategies see box 5.

EXAMPLES OF NUDGING STRATEGIES

- **Priming:** Visual or spatial cues, such as store design and signs in shops, are used to guide consumer choices effectively.
- **Micro-environment changes:** Altering the arrangement of products on supermarket shelves or website choices is a subtle yet impactful strategy.
- **Defaults:** Implementing “meatless days” in public canteens offers a predetermined choice for consumers.
- **Warnings:** Coloured carbon labels on meat products aim to inform consumers about potential health or environmental impacts.
- **Simplification:** Making vegetarian menu choices easily accessible contributes to nudging consumers towards healthier options.
- **Disclosure strategies:** Revealing environmental costs associated with meat consumption on a menu provides transparency for informed decision-making
- **Social norms:** Emphasizing what the majority of people are doing or eating serves as a powerful influence on consumer behaviour.

Box 5 Examples of nudging strategies.

Source: Reisch et al. (2021)

4.4 Information-based instruments

Various policy instruments are designed to enhance individual consumer knowledge, raise awareness, and encourage consumers to modify their habits, attitudes, and behaviour. Common information-based instruments include the use of labels that can inform about nutritional or sustainability aspects of a food item, product or meal, information campaigns, dietary guidelines which inform consumers about healthy dietary choices, and various types of educational efforts that provide consumers or professionals with new skills and competencies.

Labelling

On-package labels is intended as an easy way to provide consumers with knowledge about a certain product. It can inform about nutritional aspects, for example, percentage of whole grains and the content of salt, sugar and saturated fat. Additionally, they may convey sustainability aspects of a food item, such as whether it is organic or contributes to a more fair and just food trade system. The use of labels is well-known and implemented in the Nordic countries (see figure 7 for some examples of implemented labels). Labels can also be applied in public kitchens, restaurants, or canteens to indicate for example the degree of organic food used to prepare the meals. Different categories of labels exist which aim to inform consumers of different aspects of a food item:

- **Health-related labels:** Health-related labels inform consumers about nutritional aspects of a food item as content of healthy (as whole-grain) or unhealthy (fat, sugar or salt) ingredients. Research and analyses have shown that health-related labels in many cases positively influence consumer behaviour by signalling that the product is a better choice within its category (Röös et al. 2021; Shangguan et al. 2018). A good example in the Nordics is the Keyhole label that helps guide consumers towards more healthy food products within the respective food categories, and is used in Sweden, Norway, Denmark, and Iceland. In Finland, in addition to Heart Symbol used in food products, there is a Heart Symbol^[5] in meals served outside home that helps consumers to make better choices.

One example of the health-related label is the Nordic Keyhole food label that is designed to guide consumers towards healthier food choices in all the Nordic countries (see figure 6). This voluntary easily recognisable label highlights food products that meet specific criteria within different food groups for lower fat, sugar, and salt content, while being higher in fibre and whole grains.

5. <https://www.sydanmerkki.fi/en/>



Figure 6 Nordic Keyhole label

- Eco and sustainability labels: Eco-labelling assists consumers in choosing a more environmentally friendly option within a given product category. While eco-labels may have benefits for environment, their primary focus is thus not on encouraging consumers to reduce their consumption of high-climate impact products, such as meat (Röös et al. 2021). Examples include Aquaculture Stewardship Council (ASC), EU organic label and the Swedish KRAV label. Climate labels may be more effectual in this sense, as they disclose a food product's CO₂ footprint. Voluntary climate labelling initiatives exist in several Nordic countries, but there are currently no official climate labels. Some companies are stating the climate impact of their products on the packaging; however, they are not following any national guidelines or standards for how it is calculated.



Figure 7 Examples of organic labels in the Nordic countries and the EU.

In 2022, the Danish government decided to develop a **state-governed climate label** to help consumers make more sustainable choices, and to push food production in a more sustainable direction. In 2023, an expert group delivered their recommendations to the government for how such a label should be developed and implemented (Danish Veterinary and Food Administration 2023). They recommend a traffic light label (see suggested design in figure 8) and a publicly available database containing the climate impact of all food items, which provide the foundation of the labelling.



Figure 8 A suggested design of the state-governed climate label in Denmark.

Outside the Nordic region, some countries apply **negative labelling** to highlight attributes like sugar, unhealthy fats, salt, and caloric content. Finland has implemented a high-salt warning label. This warning guides both consumers and product developers by establishing a specific threshold for each category. Similarly, in the Nordic countries, tobacco products are required to feature warning labels that include both an illustration and text informing users of the health risks.

To enhance label effectiveness, they should be considered in conjunction with other interventions. While nutritional labels have, in some cases, resulted in unintended behaviours such as increased food consumption and overall energy intake (Oostenbach et al. 2019), they generally have a positive impact on consumers' dietary habits (Röös et al. 2021; Shanguan et al. 2018). For instance, the keyhole label has demonstrated the ability to steer consumers towards healthier choices and stimulate product development (Hedengren and Wassenius 2015; Röös et al. 2021).

Moreover, labels play a crucial role in helping consumers make more sustainable choices, with traffic light labels demonstrating a positive impact on consumers' understanding of sustainability (Osman and Thornton 2019; Ponzzone et al. 2020). However, recognizing that individuals opting for food products with nutritional labels are often more health-conscious, attributing improved eating habits solely to label use is evidently incorrect (Capacci et al. 2012).

Information efforts

Information campaigns are used to make people more aware and knowledgeable with the purpose to influence people's food behaviour through increased knowledge. Their impact is amplified when they are consistently reiterated and when complemented by other actions. While these measures are relatively easy to implement and the public acceptance is generally high, their effectiveness still tends to be limited as stand-alone activities. Nevertheless, these measures are important for expanding the public's knowledge base, altering attitudes, and support the changing of norms. These campaigns have also been noted for bolstering public acceptance of other more intrusive measures such as taxes (Röös et al. 2021).

One example is the Finnish information campaign "Meatless October", a grassroots social media campaign aimed at reducing meat consumption. The evaluation of this campaign found that participants were often strongly motivated by the campaign's sustainability frame. In their daily lives, participants' primary focus and concern revolved around the ability to prepare tasty and healthy vegetarian foods, and they were pleasantly surprised by their newfound ability to acquire these skills. Overall, the study suggests that the campaign's public context facilitated change in private practices by encouraging an experimenting process (Pohjolainen and Jokinen 2020).

Food-based dietary guidelines are an important information-based tool from the national authorities in all the Nordic countries. These guidelines inform consumers and professionals on how to compose nutritious and healthy diets, with some now including environmental aspects.

The political landscape regarding dietary guidelines in the Nordic countries is currently diverse. Finland incorporated an environmental perspective into its food-based dietary guidelines as early as 2014, while Denmark introduced dietary guidelines that include environmental considerations in 2019 (see figure 9). Both Norway and Sweden are currently in the process of developing new national dietary guidelines. In many Nordic countries, the NNR2023 has sparked debate on several levels, and between different stakeholders and actors.



Figure 9 Official dietary guidelines from the Ministry of Food, Agriculture and Fisheries in Denmark.

Food education plays a crucial role in promoting sustainable and healthy eating habits. In Finland, this is exemplified by its integration into the National Core Curriculum for Early Childhood Education and Care. Educational efforts extend beyond merely providing information, but also include development of skills and competencies to produce more sustainable and healthy meals. Targeting educators, chefs in public kitchens, and consumers alike, these initiatives often focus on practical skills and action- based learning. A notable example of such a program in Finland is 'Tasty School,' which serves as an inspiring model for food education.^[6]

School meals, for example, can have a long-lasting impact on food choices, not just for students but also potentially for their parents. Rööös and co-authors present a series of initiatives implemented throughout Sweden, such as the SmartMat Hbg in Helsingborg, training school chefs in vegetarian cooking. Other programs like Hej Skolmat, Maträtt, and Bonden I skolan, aim to increase understanding of food production and its environmental impact. Schools even involve students in gardening projects, thereby encouraging a more hands-on relationship with food (Rööös et al. 2021). Education efforts and consumer guides can contribute to the normalization of a healthier and more sustainable diet, and help the population change their eating habits (Klimarådet 2021:41). Some NGOs work on these types of efforts and provide recipes to cook more sustainable food in private kitchens.^[7]

6. <https://maistuvakoulu.fi/en/>

7. Climate friendly recipes from Concito
https://concito.dk/files/media/document/SoMa_opskrifth%C3%A6fte_F%C3%86RDIG%202.pdf

5. Linking policy instruments with the behaviour change framework

In this chapter, we explore the interaction between the various determinants that drive behavioural change, as outlined in the framework, and the policy instruments listed in Table 1. Additionally, this chapter examines how, in theory, different policy instruments, may be more or less suitable for guiding behaviour change towards better diets.

Table 1 provides a summary of the key features of various policy instruments, their level of intrusiveness, and their interconnectedness with food-, person-related, and socio-environmental determinants. The primary focus is on how these instruments are designed to function and how they intend to address the diverse determinants outlined in the framework. Furthermore, the far-right column of the table correlates policy instruments with components of behaviour change, indicating which components are addressed by each category of policy instruments.

CATEGORY OF POLICY INSTRUMENTS. LEVEL OF INTRUSIVENESS	KEY CHARACTERISTICS	FOOD-RELATED	PERSON-RELATED	SOCIAL AND ENVIRONMENTAL DETERMINANTS	WHICH BEHAVIOURAL CHANGE COMPONENTS DO POLICY INSTRUMENTS ADDRESS
Market-based instruments Medium to high	Taxes: Consumer price increases Subsidies: Consumer price reductions.	Taxes and subsidies can indirectly influence taste preferences, e.g. if healthier options are made cheaper.	Age, gender, education level and previous eating habits influence the acceptance of food taxes. More educated individuals might be more responsive to the rationale behind taxes and subsidies.	Generally higher financial impact but also health benefits of food taxes on lower income individuals. Political ideology, personal values influence the level of acceptance of food taxes.	Opportunity (impacting affordability).
Regulatory instruments High	Regulation of marketing and labelling. Regulating public procurement. Regulation of choice of e.g., school meals (including vending-machine bans and provision of free fruit and vegetables).	Over time, can have a significant influence on shaping consumer taste preferences and choices.	A significant impact on shaping beliefs and attitudes. Understanding the reasons behind regulatory measures (e.g., the health benefits of certain foods) can influence their effectiveness. This understanding can be influenced by the level of education and knowledge.	Regulating the accessibility of certain foods may be particularly beneficial for lower-income groups and children.	Opportunity (impacting availability).
Nudging Low to medium	Portion sizes/placement in restaurants and shops. Interventions. Primes carefully designed to activate specific thoughts, emotions, or associations.	May encourage individuals to taste new and different food products, altering taste and preferences.	Over time, nudging can subtly influence individual beliefs and attitudes towards certain foods and contribute to changing cultural norms. The success of nudges often depends on their alignment with existing beliefs, attitudes and social norms.	Cultural norms and values, as well as income level may influence access to food choices and receptivity to nudges.	Capability, motivation and opportunity (impacting accessibility, appeal, availability).
Information-based instruments Low	Labelling. Knowledge and support based information, campaigns/menus/dietary advice.	Labelling can alter the perceived appeal of food products. People's unique dietary needs and experiences can affect how they respond to information.	Diverse impact of age, gender, knowledge and education level on the way information is perceived and comprehended.	Place of residence and socio-cultural environment may impact on the way nutritional and health-related information is perceived, sought and comprehended.	Capability and motivation (changing beliefs, attitudes, norms, knowledge and skills).

Table 1 Description of various policy instruments and how they might relate to the different types of determinants. Some selected examples.

The influence of policy instruments on steering behaviour

The following section examines the impact of policy instruments on guiding behaviour and proposes strategies to encourage a positive trend. Assessing the effectiveness of various policy instruments in influencing behaviour towards healthier and more sustainable diets is highly important to do but also challenging, as it is highly dependent on the context in which the interventions are implemented, as well as their design and execution (Von Bah et al. 2019). Moreover, the impact is shaped by a range of factors, including an individual's economic status, health priorities, cultural norms, and the availability of healthy food options. Additionally, there are inherent limitations in research methodologies and data quality in studies evaluating the effectiveness of policy interventions aimed at promoting dietary changes, which are discussed in the 'Study limitations' section. The outcomes of such studies show considerable variation in the literature reviewed. While acknowledging these limitations, the primary aim of this section is to stimulate discussion and provide insights that can inform the development of policy interventions to effectively promote healthier and more sustainable dietary habits, rather than to present conclusive evaluations of the effectiveness of these policy instruments.

Assessing market-based policy instruments for facilitating behaviour change

Taxes can be effective in reducing demand for a taxed food product by increasing its price. The long-term effect can vary, depending on factors such as the price elasticity of demand for the product, the level of the tax imposed, and the availability of affordable alternatives. As with other policy instruments, price-based mechanisms alone may not be sufficiently effective in steering a behavioural change. In some specific cases, a combination of taxes and subsidies could play an important role in facilitating the transition of the entire food system (Röös et al. 2021). Below are some tips for selecting and utilizing market-based instruments effectively:

- Societal attitudes towards health and sustainability can either amplify or mitigate the effectiveness of taxes and subsidies. In cultures with a strong emphasis on healthy living, these instruments might be more effective (Whitmarsch et al. 2021).
- The portrayal of these instruments in the media and public discourse can shape public opinion and their effectiveness (Austin et al. 2020).

- In the Nordic context, research shows that acceptance of a meat tax depends on factors such as previous eating habits, gender, education level, and age (Röös et al. 2021). Women, those with higher education, young people, and those leaning left politically are more likely to view a meat tax positively (Röös et al. 2021).
- Taxes and subsidies on food products can have a symbolic impact, signalling that the government is taking issues like climate change or unhealthy diets seriously. This could contribute to a shift in social norms towards healthier and more sustainable food consumption (Röös et al. 2021).
- Linking food consumption taxes to earmarked revenues for specific purposes can enhance their acceptance among both consumers and producers, making the tax more politically feasible (Gren et al. 2021; Grimsrud et al. 2019; Klenert et al. 2022). For example, revenues from food taxes could be used to lower VAT on fruits and vegetables, thereby making healthy and sustainable food more accessible to consumers (Klenert et al. 2022).
- In the case of meat taxes, avoiding labelling the charge as a tax, implementing progressive taxation, and providing a clear explanation of the tax's impact have been found to strengthen public support for these taxes (Perino and Schwickert 2023).

Taxation can effectively discourage consumption of specific food items by raising their prices, with their success hinging on price sensitivity, tax rates, and alternative options. Combining taxes with subsidies may offer a comprehensive strategy to reform the food system. The effectiveness of these fiscal measures also depends on societal attitudes, media representation, and demographic variables. Tailored approaches, such as earmarking tax revenues for health initiatives and nuanced communication about the taxes, enhance public support, underscoring the critical role of fiscal policies in promoting healthier and more sustainable dietary choices.

Assessing regulatory instruments for facilitating behaviour change

Regulations have a significant potential to reshape the food landscape (physical environment), for instance, by promoting healthier food availability in public kitchens or restricting the emergence of fast-food restaurants in certain areas. The deeply rooted nature of dietary habits and preferences is a crucial factor in determining the success or failure of these regulatory measures. Altering long-standing dietary habits and preferences through regulations can be challenging if individuals are deeply ingrained in certain dietary routines. The effectiveness of regulatory actions is also influenced by the public's understanding of their underlying motives, such as recognizing the health

advantages of certain foods or acknowledging their environmental impacts. Below are some tips for selecting and utilizing regulatory instruments effectively:

- The way the regulations are implemented and the level of trust in the government can influence public response. Transparent and well-communicated incentives are likely to be more effective (Livsmedelsverket 2023a).
- Complementary efforts, such as education and upskilling of kitchen staff and public procurers, and public awareness campaigns, can enhance the effectiveness of regulatory measures by educating the public about the reasons and benefits behind these policies (Fesenfeld et al 2023; Landbruksstyrelsen 2023).

These regulatory approaches require collaboration and dialogue with private sector stakeholders to ensure feasibility and effectiveness, while balancing economic and environmental considerations. Overall, while regulatory instruments are effective in promoting healthy and sustainable food choices, their success depends on a nuanced understanding of both personal and social determinants. For instance, a person who values health (a personal factor) might be more inclined to adhere to new regulations if they are part of a community that supports and practices healthy eating (a social factor).

In the spring of 2023, the Swedish Food Agency (Livsmedelsverket) established a citizen panel consisting of 70 participants to explore ways to encourage sustainable and healthier eating habits (Livsmedelsverket, 2023a). From their discussions, 30 recommendations emerged, primarily focusing on regulating the pricing and marketing of unhealthy foods by retailers, producers, and suppliers. This supports Fesenfeld et al. (2023)'s findings that softer, less intrusive policy instruments do not necessarily receive higher public support than harder, more intrusive ones. This underscores the importance of both the design of the policy instrument and how it is communicated to the public.

Assessing nudging for facilitating behaviour change

In nudging, personal preferences and tastes are pivotal. Nudges may be less effective if they clash with deeply ingrained food preferences. Individuals with specific health concerns or dietary needs may be more open to nudges towards healthier options, whereas children could be more susceptible to unhealthy nudges in food store settings. However, it is also crucial to take into account gender norms and societal expectations. For instance, a nudge promoting responsible drinking may need to be distinctively tailored for men and women, considering their respective social norms and behaviours. The interaction between personal and social determinants also influences the effectiveness of nudging. For example, a health-conscious individual (a personal

determinant) might respond more positively to nudges in a community that values sustainability (a social determinant). As a subtle measure, nudges lead to incremental rather than drastic behavioural changes. However, these small changes can accumulate over time to create a significant impact (Contento 2021). Below are some tips for selecting and utilizing nudging instruments effectively:

- Systematic reviews indicate that the effectiveness of nudging is highly context-dependent, and the results vary across different types of nudges (Broers et al. 2017).
- Nudges may be more effective in controlled environments, such as school cafeterias or workplace dining areas, compared to broader contexts (Thapa and Lyford 2014).
- Among various nudging strategies, alterations in proximity and presentation (Laiou et al. 2021), default options like a standard menu featuring a healthy and sustainable dish in a restaurant (Leng et al. 2016), and combined nudges (Broers et al. 2017) have been particularly effective in encouraging healthier dietary choices.
- The impact of nudges is influenced by social influence and peer behaviour, which can determine the acceptance or rejection of a particular nudge (Salmivaara 2021).
- Nudges are also affected by factors such as stress, mood, and cognitive load, which can influence an individual's receptiveness to nudges (de Ridder et al. 2022).
- Nudges that align with cultural norms and values are likely to be more effective (Sunstein and Reisch 2019).

Nudging, as a strategy for influencing dietary choices, recognizes the importance of personal preferences and social contexts in shaping behaviour. Its effectiveness varies, being contingent on aligning with individual health needs, societal norms, and the specific environment where the nudge is applied. Strategies that modify proximity, presentation, and default options, particularly in settings like schools and workplaces, show promise in nudging people towards healthier choices. Moreover, the subtle, incremental changes prompted by nudges can, over time, aggregate to significant dietary shifts, especially when they resonate with cultural values and are supported by social influences.

Assessing information-based policy instruments for facilitating behaviour change

Information-based instruments alone have a limited impact in steering people towards healthier and more sustainable diets (Röös et al. 2021). While there may be a temporary increase in community knowledge and a changed attitude, evidence of significant long-term behavioural changes is limited (Capacci et al. 2012; Leng et al. 2016). Nonetheless, these tools are crucial in empowering consumers to make informed choices. When combined with other instruments, both legal and market-based, for example, to enhance understanding and acceptance, they can contribute significantly to overall effectiveness (Röös et al. 2021). Eco-labelling, while helpful in highlighting the better option within a specific product category (such as choosing between different types of fish), does not guide consumers in reducing consumption of product categories that are unhealthy or most damaging to the environment (Röös et al. 2021). Therefore, its effectiveness in guiding consumers towards optimal choices is limited. Below are some tips for selecting and utilizing information-based instruments effectively:

- The issue of excessive information, or hyper-choice, especially in labelling, should be minimized (Leng et al., 2016; Röös et al. 2021).
- Information-based instruments are often more effective when used alongside other strategies, such as nudging and regulations (Röös et al. 2021). For instance, nutritional labelling might be more impactful when combined with healthy eating programmes in schools.
- Information that aligns with an individual's existing attitudes, beliefs, cultural context, and emotional state is more likely to be accepted and influence behaviour. If the information confirms their values and beliefs, they may be more motivated to change (Contento 2011; Duralia 2023). Recognizing individual differences, information campaigns and labels can be effectively tailored to target specific groups.
- Information that is culturally sensitive and delivered through trusted social networks can have a stronger impact. People are more likely to accept information that aligns with their cultural values and is endorsed by their community (Salmivaara 2021; Perino and Schwickert 2023).
- Positive messages are generally better received. Interventions that promote healthy behaviours are found to have a greater impact than those aimed at stopping unhealthy behaviours (Afshin et al. 2017).

While information-based instruments provide essential insights for informed decision-making, they alone fall short in effecting enduring shifts towards healthier and sustainable dietary habits. The true potential of these tools emerges when they are part of a broader mix of policy measures, including legal and market-based strategies, to amplify their impact. By minimizing information overload, ensuring alignment with cultural and personal values, and integrating these instruments with other behavioural change strategies, their capacity to steer consumers towards healthier and more environmentally friendly choices can be maximized.

6. Concluding remarks

In this report, we examine determinants influencing behavioural change towards healthier and more sustainable diets in the Nordic populations, with particular emphasis on policy instruments. A Nordic behaviour change framework has been developed to facilitate an understanding of how and why measures leading to behaviour change are effective. This framework is grounded in the principle that better diets should focus on enhancing the **availability, affordability, accessibility, and appeal** of healthy dietary options, whilst concurrently reducing these factors for unhealthy diets. It also acknowledges the significance of considering various factors that influence dietary behaviour in guiding consumption patterns toward healthier and more sustainable options.

The framework describes the **factors influencing the individual's dietary behaviour** as food-related, personal-related, and socio-environmental determinants. Important food-related determinants are the sensory characteristics, and the individual's perception and preference of these. Early food experiences, for instance through kindergartens and schools can help shape these in a healthy and sustainable direction. Demographic characteristics are central for the personal-related determinants influencing food choice. Women are more health-conscious than men, and younger people are more open to adopting new food practices. Similarly, higher education and financial security are enablers for eating healthier. These factors, along with cultural and social norms, are important for designing interventions to facilitate a healthier dietary behaviour. Socio-environmental factors important for food choice are related to availability and accessibility of foods, as well as affordability and cultural associations. These factors vary considerably within and between countries and must be taken into account when designing public policy interventions towards healthier and more sustainable diets.

Insights into the determinants influencing behaviour can **guide and inform the development of interventions by policy instruments**. Addressing the capability, opportunity, and motivation of consumers to change towards a healthier diet, thus, must be central to designing interventions. These interventions can be aimed at the individual, group, or population level. Changing behaviour at the individual level provides the best result for the individual, while overarching interventions encompassing the whole population are not so precise but may show general effects.

A combination of policy instruments addressing different food choice determinants is needed to enable behaviour change among Nordic consumers. Economic factors most significantly influence consumers' food choices, both in terms of what consumers identify as important for food choice and what is observed as driving food choice. From a market-based and regulatory perspective, introducing economic incentives as drivers for changing behaviour can be affected through:

- **Taxes:** on food products that should be consumed less.
- **Subsidies:** on healthy and sustainable food products.
- **Public procurement:** Directives for public procurement of healthier and more sustainable food alternatives.

Nudging strategies, making the healthy and sustainable food choice the easier choice, work very well in changing consumers' behaviour. Nudging is particularly effective in changing and optimising the food environment and can be implemented in various settings, such as:

- **Placement:** Making the desired choice the default and easy choice.
- **Portion:** Regulating portion contents and sizes to reflect dietary advice.
- **Product characteristics:** Ensuring healthy and sustainable food choices are affordable, accessible, available, and appealing.

Information is a necessary prerequisite for ensuring and facilitating informed consumer choices. Increasing consumers' health and food literacy is essential for the effectiveness of information. However, information alone may not lead to behaviour change and is often more effective when combined with other actions. Information can take many forms, such as:

- **Campaigns:** Public information campaigns are effective if conducted regularly, preferably in combination with other measures.
- **Educational programmes:** Knowledge is essential for understanding the importance of a healthy and sustainable diet. Schools, personnel in public institutions with food responsibility (e.g., chefs), and health personnel are potential target areas.
- **Labelling:** Many consumers use information on labels when making choices. Labelling may be regulated through policies of both national and EU origin

These findings are targeted towards actions that can be implemented by governments and governmental institutions. However, they are also relevant for the food industry, retailers, food service, and other actors in the food chain. Based on the review of behaviour change determinants, the authors suggest four important points to keep in mind when developing policy instruments:

- Analyse the characteristics of the problem and, in fact, the root cause that needs to be solved. These characteristics determine the type of intervention that could be effective.
- Understand the target audience and its characteristics (their demographics, cultural background, economic status, beliefs, etc.), and their specific needs, preferences, and challenges related to the given behaviour.
- Identify and understand the behaviour that needs to be changed, including its underlying causes, contexts, and the specific challenges.
- Choose a combination of policy incentives with these characteristics in mind to achieve greater efficiency.

To implement economic instruments such as taxes, subsidies, or fees/charges, an underlying administrative or legal framework is generally essential. Informative instruments are also regularly utilized to keep stakeholders updated of the implemented measures or when they are used in tandem. The most effective combination of these instruments should be strategically chosen to address the specific challenge of achieving a healthy and sustainable diet.

7. Recommendations

Drawing from the findings of this report and project, five policy recommendations have been formulated to enhance public health and environmental sustainability throughout the Nordic region.

#1

A range of complementary interventions is needed – no single solution exists

Use the Nordic behaviour change framework developed by this report to facilitate an understanding of how and why measures leading to behaviour change are effective. Behaviour changes and food consumption are just one part of a shift towards healthy and sustainable food systems. Interventions across the supply chains are needed. This needs to be clear in the communication of interventions to increase understanding of the intended effect of the interventions.

#2

The Nordic countries can be front-runners with regulatory instruments such as sugar and meat tax, and/or subsidies on more healthy and sustainable products such as vegetables and fruits

Research shows that these kinds of interventions have effect on people's choices. By taking the steps together across the Nordic region to further investigate and develop these interventions, greater public acceptance and support could be generated. This would also lessen the risk of shopping leakage across borders that could harm national production.

#3

Enhance public procurement policies and culinary education

Boost demand for healthy and sustainable foods, while familiarizing Nordic citizens with better food choices. This approach seeks to utilize the public sector's buying power to effect substantial changes in food production and consumption, ensuring easier access to nutritious foods in educational settings. Additionally, it emphasizes the importance of improving chefs' culinary skills in public kitchens, enabling the preparation of appealing meals that adhere to nutritional guidelines, thereby influencing early life food experiences and tastes positively.

#4

Develop a joint Nordic Climate Food Label - building on the success of the Keyhole label and the Nordic Nutrition Recommendations

The Nordic countries can collaboratively progress with a Nordic Climate Food Label, drawing inspiration from its development in Denmark. This approach mirrors the establishment of the Keyhole label in the Nordic countries, which originated in Sweden before being adopted in Norway, Denmark, and Iceland. Establishing a Nordic working group to advance this initiative further, utilising the Danish model as a basis, would be advantageous for widespread adoption across the Nordic region.

#5

Formulate joint Nordic strategies and policies to reduce marketing of unhealthy foods

Numerous companies operate across all Nordic countries. Identifying common ground and developing unified approaches could facilitate a smooth transition towards a more integrated and sustainable Nordic food future. Establishing public-private partnerships at a Nordic level could further aid this process.

About this report and Nordic food environments and behaviour change project

This report is part of the Healthy and Sustainable Food Systems project, under the Nordic Sustainable Lifestyles programme, initiated by the Nordic Council of Ministers. Specifically, the report is written as part of the Nordic Food, Environments, and Behaviour Change sub-project, managed by Nordregio, aiming to provide a knowledge base of effective policies for implementation in the Nordic countries. These policies are designed to initiate the necessary structural changes to enable sustainable and healthy consumption, underscoring its importance as a crucial element of the broader initiative to promote healthy and sustainable food systems.

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Appendix: Study approach and limitations

The project was organized as follows: First, we conducted a comprehensive literature review to identify relevant studies that could shed light on measures capable of influencing behaviour change within a Nordic context. Second, we hosted a workshop, bringing together stakeholders and interested parties from the Nordic countries to gather valuable input on stakeholder engagement. Third, we crafted a policy brief based on our initial findings, with the aim of sharing insights at the NNR2023 release and the ministerial meeting. Finally, we synthesised our discoveries in a comprehensive final report.

Literature search strategy and assessment of relevance

A literature search was conducted to identify literature describing behavioural change in relation to food environments in a Nordic context. The rationale was that Nordic countries have similar cultural backgrounds and more trust in authorities compared to other countries often used as comparisons. Time-period for the literature search was set to studies published 2010 and later. The reasoning for this was to cover status on literature published in the period immediately before and after launching of the previous Nordic Nutrition Recommendations in 2012.

In summary, the search found that information about nutrition recommendations must be easily available and findable (i.e. internet), in formats that reach consumers with different needs and characteristics (brochures, fact sheets, illustrations etc.), and from trusted sources (health personnel, government, sources without vested interests). Furthermore, the information should be presented in a way that is understandable, engaging, relevant, and provides guidance for implementation. Nudging strategies, making it easier for consumers to make healthier choices through changing the environment, provide good results in changing consumers' behaviour (Thaler & Sunstein, 2009). Nudges typically involve one or more of the following factors: Product,

price, place, promotion, priming, packaging, proof, presentation, people, and personality. Above all, pricing has been shown to be major predictor of food choice and might thus facilitate behaviour change. However, none of these prerequisites guarantee that consumers follow the advice and/or change their behaviour. The results of the literature search are presented in the complementary document *Literature search Nordic Food Environment project*. This document is available upon request to the reports' authors.

National dietary surveys in the Nordic countries

Denmark: Danskernes kostvaner 2011-2013." Age group: 18-75 years, Sample size: n=3016. Technical University of Denmark. Accessed at [DTU Food](#)

Data were collected as part of the Danish National Survey of Dietary Habits and Physical Activity (DANSDA), representing a sample of 3,946 individuals aged 4-75 (only data from ages 18-75 are used in this report). Participants recorded their food intake over seven consecutive days using a pre-coded (semi-closed) questionnaire, which included answering categories for the most consumed foods and dishes in the Danish diet.

Finland: "FinDiet 2017." Age group: 25-74 years, Sample size: N=3099. European Food Safety Authority. Accessed at [EFSA](#).

A sample of adults aged 18 years and over was randomly selected from the Population Register (n=10,247). A 30% random subsample aged 18-74 years (n=3,099) from the FinHealth 2017 Survey was invited to participate in the FinDiet 2017 Survey. Dietary intake was assessed using two non-consecutive 24-hour dietary recalls.

Iceland: "Hvad bordar Íslendingar 2022." Age group: 18-80 years, Sample size: N=1312. Accessed at [Hvadbordaislendingar_vefur_endanlegt.pdf \(hi.is\)](#).

Data were collected for the Hvað borða Íslendingar Diet Survey from a random sample of 2,000 individuals, randomly selected from the national registry. Of these, 1,545 had a registered telephone number and were contacted. A total of 822 participants completed both interviews. Dietary intake was assessed using two non-consecutive 24-hour dietary recalls and a frequency questionnaire.

Norway: "Norkost 3, 2011." Age group: 18-70 years, Sample size: N=1787. "Norkost 3 – En landsomfattende kostholdsundersøkelse blant menn og kvinner i Norge i alderen 18–70 år, 2010–11." Accessed from [Kudos](#).

The methodology for the survey comprised two randomly assigned non-consecutive 24-hour recalls and a food frequency questionnaire. Data collection for Norkost 4 is currently in progress, undertaken and funded by the Department of Nutrition at the University of Oslo and the Norwegian Institute of Public Health

Sweden: "Riksmaten vuxna 2010-2011." Age group: 18-80 years, Sample size: N=1797. National Food Agency, Sweden. Accessed from [Livsmedelsverket](#):

Data from the Riksmaten 2010–11 dietary survey were obtained from a stratified random sample by sex, age groups, and regions. The total number of respondents was 1,797, representing a 36 percent response rate. The diet was assessed using a food and drink diary over four days.

Study limitations

The report does not aim to provide an exhaustive review covering all measures intended to influence consumer behaviour in the Nordic countries. The specific focus has been on the role of public sector actors in facilitating behaviour change, while the role of other actors in the food production and supply chain have not been addressed. Furthermore, the report specifically focuses on policy instruments that can support greater adherence to national dietary guidelines and/or NNR2023 (Nordic Nutrition Recommendations). Consequently, we do not delve into aspects related to food waste, seasonality, and local food consumption.

Certain limitations are associated with the study's specific focus on the Nordic countries, where search terms and strategies may not adequately encompass all relevant literature from these regions. Additionally, studies containing pertinent information may have been unintentionally omitted if they fell outside the scope of our search strategies. Despite our best efforts to capture reports, governmental documents, and other grey literature shedding light on the topic, omissions are possible as these sources are not as readily accessible as scientific publications.

However, despite these limitations, the collected background literature conveys a relatively consistent understanding of measures that policymakers can implement to effect changes in consumer behaviour. Consequently, we believe that the overview of the types and effectiveness of measures presented in this report hold relevance for stakeholders and policymakers as they strategize and plan actions to encourage healthier and more sustainable food behaviours within the population.

Certain limitations are also associated with research methodologies and data quality in studies assessing the effectiveness of policy interventions aimed at promoting dietary shifts (Capacci et al. 2012; Reisch et al. 2021). One of the key reasons is that the existing evaluations often focus primarily on changes in attitudes, which do not always lead to healthier eating habits or improved nutritional status. Tracking the actual behavioural responses to these policies over an extended period is challenging, making it difficult to determine the success or failure of these interventions in improving public health (Capacci et al. 2012; Rööß et al. 2021). Furthermore, empirical studies are missing (Rööß et al. 2021) and often rely on fragmented evidence and inadequate data (Capacci et al. 2012). Consequently, this necessitates a cautious approach in drawing conclusions from these studies. Further research is needed to bridge these knowledge gaps, potentially involving more longitudinal studies and robust data collection methods, to provide a clearer understanding of how policy interventions can effectively influence dietary behaviours and improve public health outcomes.

Complimentary literature search document

This document is available upon request from the report's authors.

About this publication

Policy tools for sustainable and healthy eating: Enabling a food transition in the Nordic countries

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