

What's New for Sustainable Healthy Diets?

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Summary Points

- Sustainable healthy diets must encompass four pillars as defined by The Food and Agriculture Organisation (FAO) – nutrition, culture, economy and environment. While sounding quite simple, achieving balance across these four pillars is complex and country specific.
- Various methods are used to investigate sustainable diets and their advantages and limitations should be understood to ensure correct interpretation by those making recommendations. Optimisation modelling seems to provide the best approach in terms of ensuring all pillars of sustainability are considered when identifying sustainable healthy diets. This approach is useful for policymakers when developing food-based dietary guidelines at the population level.
- The acceptability of more sustainable food based dietary guidelines is important to ensure adoption by the population. Results from the SuHe project will add to our knowledge base on sustainable healthy eating guidelines and what is acceptable to Irish consumers.
- The European Union (EU) Farm to Fork strategy outlines the plan for sustainable healthy diets in Europe, including changes to food labels and addressing food waste. While consumer demand for information on food sustainability is apparent, there are likely to be future challenges in presenting this information in an accessible format which can truly aid both healthy and sustainable food choices.

Editorial

In this issue, we address the topic of sustainable healthy diets including updates on developments at both national and European level. As Ireland joins other countries in starting to look at national healthy eating recommendations through the lens of sustainability, it is important that dietetic and nutrition professionals keep abreast of evidence in this area. What is becoming clear is that there may be many variations of a sustainable healthy diet which can play to both the nutritional needs and preferences of people at different stages of life while also respecting other aspects such as the environment and economy. Providing flexibility is likely to engage more people in to adopt more sustainable healthy diets.

On page 8 we feature our new Nutrition & You booklet: Menopause, launched at Ireland's first Menopause Summit in Feb 2023. Endorsed by the INDI, it provides guidance to women on nutritional considerations at this important time.

We hope you find this an interesting edition of DN Forum. We would also encourage you to check out the Health Professional area of the NDC website, where you can access other NDC resources.

Your comments and feedback are very welcome via: nutrition@ndc.ie



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INTRODUCTION

In the landscape of climate change, the Covid-19 pandemic and risks to food security, the concept of sustainable healthy diets has never been so important. The Food and Agriculture Organisation (FAO) define 'sustainable healthy diets' as:

- nutritionally adequate, safe and healthy
- culturally acceptable and accessible
- economically fair and affordable
- environmentally protective (respectful of biodiversity and ecosystems), while optimising natural and human resources¹.

These are the four pillars of sustainable healthy diets, where emphasis on one pillar needs to be adjusted to ensure harmony across all and to ensure this can be maintained in the long term. While sounding simple, the reality is that a sustainable healthy diet is quite complex, as demonstrated in Figure 1.

For sustainable healthy diets to become a reality, the development of sustainable food systems is necessary. A food system involves 'all actors involved in the production, aggregation, processing, distribution, consumption and disposal of food products that originate from agriculture, forestry or fisheries, and parts of the broader economic, societal and natural environments in which they are embedded'². A sustainable food system (SFS) delivers food security and nutrition for all in such a way that the economic, social and environmental bases are not compromised for future generations².

This means:

- It is profitable throughout (economic sustainability);
- It has broad-based benefits for society (social sustainability); and
- It has a positive or neutral impact on the natural environment (environmental sustainability)

In line with a food systems approach, in 2020, the European Commission (EC) published its Farm to Fork Strategy which aims to make food systems fair, healthy and environmentally friendly³. It discusses measures needed to ensure food production systems are sustainable and addresses how Europeans can move towards sustainable healthy diets as well as ensuring food security and reducing food waste. It is at the heart of the European Green Deal which aims to make Europe the first climate-neutral continent by 2050.



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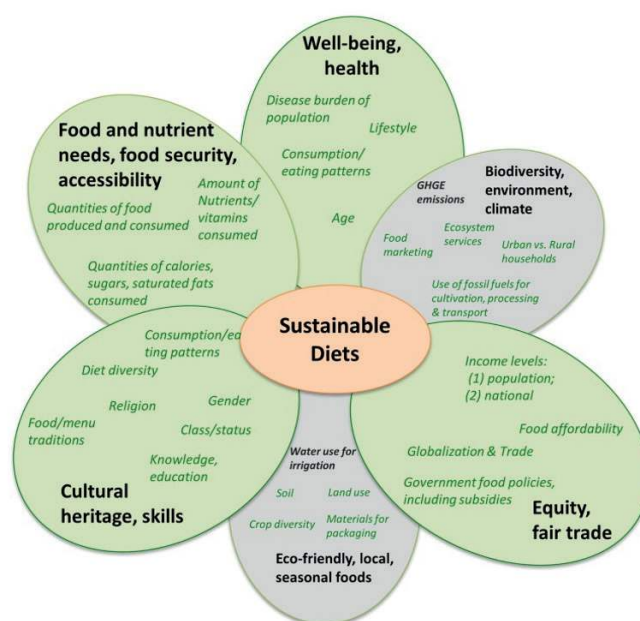


Figure 1 The complexity of sustainable healthy diets. The key components, determinants, factors, and processes of a sustainable healthy diet are shown here⁴

In this article, the latest research will be discussed including the development of food-based dietary guidelines with a sustainability focus, novel Irish research in this area, and regulatory and policy elements that may be warranted to change consumer behaviour in this area such as the introduction of nutrient profiles, nutritional and eco-labelling, and reduction of food waste.

FOOD BASED DIETARY GUIDELINES

As part of their guiding principles for sustainable healthy diets, the FAO and the World Health Organisation (WHO) recommend the setting of Food based dietary guidelines (FBDGs) bearing in mind the four pillars of sustainability⁵. They note that 'countries should decide on the trade-offs according to their situations and goals'. Many countries already include sustainability in their FBDGs such as the Nordic countries, Brazil and Germany⁶. Qatar, one of the first countries to take this approach, include recommendations for emphasising plant-based foods, having minimal processed and packaged foods, consuming local produce, and reducing food waste⁷.

The EU has previously called for a move to more plant-based diets however there remains a wide range of definitions and interpretations of what this is exactly. Furthermore, their impact on nutritional adequacy and status in different populations is not yet clear⁸. Plant-only diets contain no animal proteins (including meat, fish, dairy and eggs) and are also called a vegan diet. A vegetarian diet is where dairy products and eggs are included. A flexitarian diet is where both animal and plant sources are included but plant-based foods are eaten more often⁹. While vegan diets can be healthy it is recognised that the more food groups that are excluded, the more challenging it becomes to ensure an individual achieves all the nutrients they require. For example, vitamin B12 is only found in animal sources and if these foods are avoided, a supplement must be consumed. Similarly, it can be more challenging although not impossible to achieve adequate amounts of other important nutrients such as calcium, iron, iodine and other B vitamins. Despite the popularity of Veganuary, adoption of vegan diets remains low in Ireland at around 2%¹⁰.

Another consideration for FBDG's is that sustainable healthy dietary patterns must evolve across the lifecycle along with the different nutritional requirements. Certain groups like older adults and young children will have high nutrient requirements relative to their total energy requirements and so meeting targets may be more difficult. There is some evidence that it can be challenging to achieve all essential amino acids through plant protein sources alone, in particular for older adults and athletes¹¹⁻¹². Recent scientific guidelines from the Food Safety Authority of Ireland (FSAI) encourage older adults to consume a more protein-dense diet including foods such as meat, poultry, fish, dairy and eggs regularly throughout the day as these foods stimulate muscle protein synthesis¹³. Younger children are reliant on dairy as a source of protein as well as calcium while 9-18 year olds in Ireland are advised to consume five

servings of dairy to meet their calcium requirements at a time when peak bone mass is being laid down.

Methods for investigating sustainable diets

It is not often appreciated that a wide variety of methods are used to investigate the sustainability of diets. These have been summarised recently along with their limitations and advantages to assist policymakers and healthcare professionals develop recommendations¹⁴. Perignon and Darmon (2022) have grouped the methods into four categories which include assessment of (1) hypothetical diets, (2) existing diets, (3) subsets of the population who already have more sustainable dietary patterns (positive deviants) and (4) models which includes a set of factors to consider (e.g. nutrients, cost, number of foods, greenhouse gas emissions. etc) termed 'constrained optimisation'¹⁴. For example, using approach 1, the green house gas emissions (GHGEs) of a pre-determined Mediterranean diet were estimated at 72% lower than the existing Spanish diet it was compared against. However, it also contained 61% fewer calories which could explain the reduction but also raises questions over whether the hypothetical diet is a realistic option¹⁵. In the UK, adherence to government dietary guidelines was shown to reduce GHGEs by 30%¹⁶ but using this method does not show the potential for further improvements. Modelling of French diets using approach 4 with a constraints model showed that nutritional adequacy, cultural acceptability and affordability of the diet may not be compatible with GHGE reduction of more than 30%¹⁷. Researchers conclude that clearer guidelines and transparency around trade-offs between nutrition and environmental pillars are needed when decision are made for FBDG's.

The focus with sustainable diet models is frequently on nutrient adequacy or individual nutrients and does not consider potential benefits of the food matrix or indeed negative aspects of ultra-processing. For example, there is a growing body of food matrix research which demonstrates that the health effects of foods cannot be predicted based on the individual nutrient profile alone and the interaction of the overall food structure with nutrients may be important¹⁸. Finally, modelling of sustainable diets is reliant on multiple food and environmental databases and conclusions are only as accurate as the data sources used. These data sources need to keep pace with constant improvements in the many environmental factors (e.g. water use, emissions etc) that feed into such modelling as well as emerging standardisation of methodology in this area (e.g. life cycle analysis).



NOVEL IRISH RESEARCH

Developing appropriate FBDGs which are in line with the concept of sustainable healthy diets is a challenge for policymakers. On one hand, research in high-income countries shows that moving toward existing healthy eating recommendations will result in a reduction of GHGEs but this has not been achieved in most countries¹⁶. Therefore, one of the key challenges is being able to make changes to existing FBDGs that are acceptable to individuals. A previous review in this area suggests that 'more research of the types of dietary changes that consumers are willing to consider and on methodologies or indicators that allow better assessment of the dimension of acceptability would help to identify more realistic alternative diets'¹⁹.

This concept is currently being investigated in Ireland as part of the SuHeGuide project which aims to develop sustainable healthy eating guidelines for adults living in Ireland²⁰. SuHeGuide is a multicentre four-year project which involves Teagasc, University College Dublin (UCD), University College Cork (UCC) and Queens University Belfast (QUB), co-funded by the Department of Food, Agriculture and the Marine (DAFM) and Department of Agriculture, Environment and Rural Affairs (DAERA). As well as developing the guidelines, the 'My Planet Diet' study which is currently underway aims to test whether a personalised approach to sustainable healthy eating guidelines are acceptable and meet all the nutrient

goals of the individuals compared with giving general healthy eating advice²¹. The other important aspect of this particular component of the SuHeGuide project is that the dietary recommendations are personalised to each participant based on their age, sex, body size, physical activity levels and current dietary intake in an attempt to achieve a more acceptable diet for that individual as well as a more sustainable dietary behaviour change.

As part of the project, the researchers hosted an online workshop and invited various stakeholders to discuss the characteristics of a sustainable healthy diet in the Irish context and initiate dialogue in this regard. Evidence from the stakeholder engagement workshop along with other national FBDGs, published research on the topic of sustainable healthy diets and existing dietary patterns in Ireland were used to formulate the dietary guidelines being tested in the aforementioned My Planet Diet study. The data collection phase of the My Planet Diet study will finish in 2023 and so researchers expect to start communicating outcomes related to the impact on diet-related GHGEs, nutrient intakes and status, health biomarkers as well as participants' experience of moving to a more sustainable diet. The findings of this research will be important for policymakers when they are looking at including sustainability as part of healthy eating dietary guidelines in Ireland.

REGULATORY CHANGES TO SUPPORT SUSTAINABLE HEALTHY DIETS

One of the aims of the Farm to Fork Strategy is to empower EU citizens to make healthier and more sustainable food choices and reduce food waste. Part of this will involve a revision of the Food Information to Consumers (FIC) Regulation 1169/2011(21) by the European Commission (EC). The initiatives include the following:

- introducing harmonised mandatory front-of-pack nutrition (FOP) labelling and setting nutrient profiling criteria to restrict claims made on foods
- extending mandatory origin or provenance information for certain products
- revising the rules on date marking ('use by' and 'best before' dates)

An EU legal framework is also proposed, which will govern consumer information related to the sustainability of food products. In conjunction with labelling systems such as FOP, animal welfare labelling, and green claims, it will encompass the provision of consumer information relating to the nutritional, climate, environmental and social aspects of food products²². This will help ensure a level of standardisation for this information, providing the legal rules and creating a level playing field for all.

Some of this work is now stalled at the European Commission level, due to priority issues on food security. Although there is still no available timeline for progress of many of the initiatives, below is a brief update on the current state of play.



1. Nutrition labelling

To make it easier for consumers to choose affordable, healthy and sustainable food, the Commission have proposed an EU-wide mandatory FOP nutrition labelling system. FOP labelling is simplified nutrition information on the front of food packages, to help consumers with food choices. Making this type of labelling mandatory is suggested to help encourage food industry to reformulate their products, and indeed this has been seen in some countries²³.

In scientific advice to the Commission on this issue, the European Food Safety Authority (EFSA) concluded that 'as excess intakes of SFAs, sodium and added/free sugars and inadequate intakes of dietary fibre and potassium are associated with adverse health effects, they could be included in nutrient profiling models' and 'energy could be included because a reduction in energy intake is of public health importance for European populations'²⁴. While EFSA provided this view, this work is still ongoing at the Commission, to adopt a EU-wide harmonised approach.

Several different FOP labelling schemes are already in use across the globe, mostly on a voluntary basis, including the Keyhole logo, the Traffic Light system, the Health Star Rating and Nutri-Score (see Figure 2). The Nutri-Score was the main candidate being considered for adoption EU-wide. It is one of the most studied FOP labelling systems and 7 countries have already implemented it or plan to do so. A review

published in 2022 discussed several concerns with the system, including that Nutri-Score is not always in line with national dietary guidelines and may need to be adapted²⁵. The researchers noted that if adaptations are made to the algorithm used in the system, it's not clear if it supports reformulation across different food groups or if group specific adaptations are needed. They conclude the FOP label and dietary guidelines need to be aligned, in order to provide a consistent message to consumers. This is important for dairy products, for example cheese, which is recommended as part of healthy eating guidelines due to the benefits of protein and calcium but receives a low Nutri-Score. Researchers are now calling for more work on the applicability of the Nutri-Score system to various European diets and recommendations.

2. Environment Labelling

The concept of environmental labels is not new – there are approximately 200 ecolabels currently used on food produced in the EU, while there are more than 450 used worldwide²⁷. Some of the more well-known and established ecolabels include Fairtrade and Organic, while labels including measures of carbon footprint, water and land use are becoming more common. One example is the Eco-Score, developed in France²⁸. It provides a colour code from green (low impact) to red (high impact) to indicate the 'ecological impact' of the product using Life Cycle Analysis. This measures the environmental impact from farm, raw materials, production, sales and consumption. It also takes recycled packaging into consideration.

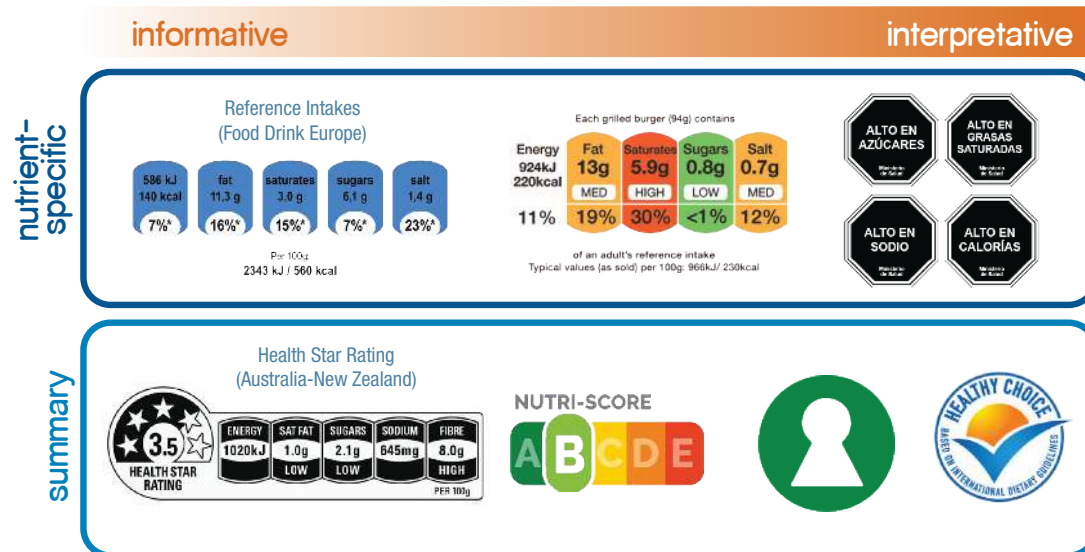


FIGURE 1 TYPES OF LABELLING SYSTEMS AND EXAMPLES OF GOVERNMENT ENDORSED SCHEMES

Figure 2 Adapted from WHO Manual to develop and implement front-of-pack nutrition labelling (2020)²⁶

The provision of such information makes sense as it enables consumers to make more environmentally informed decisions at the point of purchase²⁹. However, it is important that such information is accurate and a standard methodology is used to assess product impact on the environment, to avoid 'greenwashing' and misleading the consumer²⁷.

In terms of the effectiveness of ecolabels, there has been some work to date conducted using an experimental virtual online supermarket platform testing different ecolabel versions^{30,31}, while a recent systematic review by Potter and colleagues concluded that there was preliminary evidence that ecolabels can promote the selection, purchase and consumption of more sustainable food and drinks³². Most recently, a large intervention trial conducted in 28 worksite cafeterias, showed no evidence that the display of ecolabels influenced the sustainability of food purchases²⁹. Thus more exploration of the effectiveness of ecolabels on food purchase in real-world settings with wider ranges of meals on offer and on driving the development of recipes with lower environmental impact is needed²⁹.

3. Combined sustainability labelling

The impact of a combined label approach that would include nutrition, environment, animal welfare as well as climate and social aspects of foods remains largely unexplored in the scientific literature¹⁶.

Research testing the Nutri-Score and the Eco-Score combined found it improved nutritional quality of products chosen in a mock-up online supermarket³³. However, the environmental impact only improved when accompanying 'digital nudges' were used, such as product recommendations. While this is positive for consumer nutrition, it also illustrates a possible need to think wider than food labels alone when urging consumers to make a sustainable choice.

Another study using Nutri-Score and a globe-type ecolabel found no significant effect of the combined labelling on the healthiness of products chosen in the virtual supermarket³¹. Products were however lower in fat, saturated fat and higher in carbohydrate content compared to control. In this study Nutri-Score used alone did not impact either environmental or healthiness rank of products chosen, which the authors note may be due to UK participants' unfamiliarity with this particular labelling scheme.

While combined sustainability labelling is not yet developed EU-wide, some individual country schemes are continuing to progress none-the-less. The UK based Omni Action initiative is developing a framework spanning five topics: food safety, nutrition, labour, environmental impact and land sovereignty³⁴. They aim to use multiple criteria to calculate the indicators of a sustainable diet. For example, they note a 'complete' nutrient profile of a food, should include how it was produced and how the body absorbs it.

According to a 2020 Eurobarometer survey, sustainability information is highly sought after by consumers, with 88% of EU citizens in the survey agreeing that sustainability should be compulsory on food labels³⁵. However, there are numerous challenges that first need to be addressed, including how to present this information so that consumers make the best choices while understanding sustainability aspects of food. In addition, given current cost of living challenges, it is not known how consumers would balance this information against the main driver of food purchase, like price. For nutrition professionals, a key focus will be how nutrition information will be prioritised by consumers alongside other sustainability metrics and messages.

4. Origin Information

Certain rules already exist in the EU that require an indication of the country of origin or place of provenance of foods such as specific products like meat, eggs, honey and olive oil or in cases where the consumer may be misled. The EU Farm to Fork strategy will now aim to extend these policies to facilitate an informed food choice that is sustainable and healthy.

It should be noted however that recent research commissioned by the EU to inform this policy shows while country and place of origin influences consumer food choice, it's not a priority consideration when shopping³⁶. More and better consumer education and making the information more accessible to consumers, have also been recommended.

5. 'use by' and 'best before'

Consumer misunderstanding of the dates on food packaging results in food being unnecessarily discarded and contributes to food waste. As much as 10% of total food waste can be linked to confusion around date marking, which is 'best before' and 'use by' dates³⁷. The EU have proposed a review of these policies as part of their food waste reduction targets (see below) and to facilitate sustainable healthy diets. Part of this work will be to revise the list of foods that require a 'best before' date, and possibly even removing it from some products with a long shelf-life.

6. Food Waste

The FAO estimates 1/3 of all food produced for human consumption is wasted globally, or 1.3 billion tons of food per year³⁸. Reducing food waste and loss is critical for achieving a sustainable and resource efficient food chain. When food is wasted, environmental resources are used for no benefit, with the food instead decomposing in landfill while we struggle to feed people who cannot afford enough food. In recognition of the ethical and environmental concerns, legally binding targets to reduce food waste across the EU are to be put in place before the end of 2023.



In Ireland an estimated 30% of commercial waste and 14% of household waste is food³⁹. Research on Irish consumer attitudes towards food waste have found⁴⁰:

- young males are the least concerned whereas older female consumers are highly engaged
- vegetables (0.11kg), fruit (0.09kg) and bread (0.06kg) are the most wasted items weekly
- the main reasons for food waste are expired food (33%), rotten taste or smell (27%), and waste from meals (18%)

The Government has set a target of 50% reduction in food waste by 2030⁴¹. In working towards this, health professionals can have a key role to play in educating consumers on waste minimising behaviours including planning food purchases, preparation and consumption, freezing food and eating leftovers.

CONCLUSION

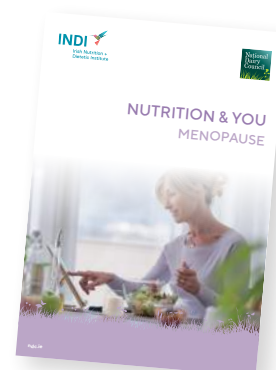
There is a clear need to develop more sustainable food systems which will enable individuals to consume sustainable healthy diets. The progress of the EU Farm to Fork Strategy will assist this goal through regulatory measures regarding labelling and food waste targets. To support new labelling rules, more studies are warranted to understand how consumers will utilise additional information on labels to make the best and most informed sustainable healthy choices. Novel work in Ireland on acceptability, nutritional adequacy and affordability of food based dietary guidelines that incorporate sustainability aspects will also add to our growing understanding of this complex area.

References

- Gonzalez Fisher C & Garnett T (2016) Plates, pyramids, planet: developments in national healthy and sustainable dietary guidelines: a state of play assessment. Food and Agriculture Organization of the United Nations and The Food Climate Research Network at The University of Oxford.
- Food and Agriculture Organisation (2018) Sustainable Food Systems: Concept and Framework. Food and Agriculture Organisation. <http://www.fao.org/3/ca2079en/CA2079EN.pdf>
- European Commission (2020) Farm to fork strategy: for a fair, healthy and environmentally-friendly food system. Available at https://food.ec.europa.eu/horizontal-topics/farm-fork-strategy_en
- Johnston J, Fanzo J & Cogill B (2014) Understanding sustainable diets: a descriptive analysis of the determinants and processes that influence diets and their impact on health, food security, and environmental sustainability. *Adv Nutr* 5, 418–429.
- Food and Agriculture Organisation & World Health Organisation (2019) Sustainable healthy diets – Guiding principles. Rome.
- Magkos F, Tetens I, Gjedsted Bügel S et al. (2020) Perspective: A perspective on the transition to plant-based diets: a diet change may attenuate climate change, but can it also attenuate obesity and chronic disease risk? *Adv Nutr* 11, 1–9.
- Food-based dietary guidelines – Qatar (fao.org)
- Kent G, Kehoe L, Flynn A, Walton J. Plant-based diets: a review of the definitions and nutritional role in the adult diet. *Proc Nutr Soc.* 2022 Mar;81(1):62–74. doi: 10.1017/S0029665121003839. Epub 2021 Dec 20. P
- Derbyshire E (2017) Flexitarian diets and health: a review of the evidence-based literature. *Front Nutr* 3, doi: 10.3389/fnut.2016.00055.
- BordBia Dietary Lifestyles Feb 2021. <https://www.bordbia.ie/globalassets/bordbia2020/industry/insights/new-publications/dietary-lifestyles-report-march-2021.pdf>
- Clarys P, Deliens T, Huybrechts I et al. (2014) Comparison of nutritional quality of the vegan, vegetarian, semi-vegetarian, pesco-vegetarian and omnivorous diet. *Nutrients* 6, 1318–1332.
- Domić J, Grootswagers P, van Loon L et al. (2022) Perspective: vegan diets for older adults? a perspective on the potential impact on muscle mass and strength. *Adv Nutr* 13, 712–725.
- Food Safety Authority of Ireland (2021) Scientific Recommendations for Food-Based Dietary Guidelines for Older Adults in Ireland Dublin: Food Safety Authority of Ireland.
- Perignon M & Damon N (2022) Advantages and limitations of the methodological approaches used to study dietary shifts towards improved nutrition and sustainability. *Nutr Rev* 80, 579–597.
- Saez-Almendros S, Obrador B, Bach-Faig A, et al (2013). Environmental footprints of Mediterranean versus Western dietary patterns: beyond the health benefits of the Mediterranean diet. *Environ Health*, 12:118.
- Steenon S & Buttriss J (2021) Healthier and more sustainable diets: What changes are needed in high-income countries? *Nutr Bull* 46, 279–309.
- Perignon M, Masse G, Ferrari G et al. (2015) How low can dietary greenhouse gas emissions be reduced without impairing nutritional adequacy, affordability and acceptability of the diet? A modelling study to guide sustainable food choices. *Public Health Nutrition* 19, 2662–2674.
- Timon C, O'Connor A, Bhargava N et al. (2020) Dairy consumption and metabolic health. *Nutrients* 12, doi:10.3390/nu12103040.
- Perignon M, Vieux F, Soler L et al. (2016) Improving diet sustainability through evolution of food choices: review of epidemiological studies on the environmental impact of diets. *Nutr Rev* 75, 2–17.
- <https://www.ucc.ie/en/vitamins/history/suhealthguide/>
- <https://www.ucc.ie/foodandhealth/more/humanhealthstudies/myplanetdiet/>
- European Commission (2022) Revision of the regulation on food information to consumers. Available at https://food.ec.europa.eu/safety/labelling-and-nutrition/food-information-consumers-legislation_en (Accessed on 03/10/22)
- Neal B, Crino M, Dunford E et al. (2017) Effects of different types of front-of-pack labelling information on the healthiness of food purchases—a randomised controlled trial. *Nutrients* 9, 1284.
- European Food Safety Authority Panel on Nutrition, Novel Foods and Food Allergens (EFSA NDA Panel) (2022) Scientific Opinion on the scientific advice related to nutrient profiling for the development of harmonised mandatory front-of-pack nutrition labelling and the setting of nutrient profiles for restricting nutrition and health claims on foods. *EFSA Journal* 20, 7259.
- Van der Bend D, van Eijnden M, van Roost M et al. (2022) The Nutri-Score algorithm: evaluation of its validation process. *Front Nutr* 9, 974003.
- World Health Organisation (2020) Manual to develop and implement front-of-pack nutrition labelling: guidance for countries on the selection and testing of evidence-informed front-of-pack nutrition labelling systems in the WHO European Region. Copenhagen: WHO Regional Office for Europe; Licence: CC BY-NC-SA 3.0 IGO
- European Commission (2022) Initiative on substantiating green claims Available at https://ec.europa.eu/environment/eussd/smgp/initiative_on_green_claims.htm (Accessed on 03/10/22)
- <https://www.foodnavigator.com/Article/2021/01/12/Eco-Score-New-FOP-label-measures-the-environmental-impact-of-food>
- Pechey R, Bateman P, Cook B et al. (2022) Testing the effectiveness of ecolabels to reduce the environmental impact of food purchases in worksite cafeterias: a randomised controlled trial. *Appetite* 179, 106277.
- Potter C, Pechey R, Clark M et al. (2022) Effects of environmental impact labels on the sustainability of food purchases: Two randomised controlled trials in an experimental online supermarket. *PLoS ONE* <https://doi.org/10.1371/journal.pone.0272800>
- Potter C, Pechey R, Cook B et al. (2022) Effects of environmental impact and nutrition labelling on food purchasing: an experimental online supermarket study. *Appetite* <https://doi.org/10.1016/j.appet.2022.106312>.
- Potter C, Bastounis A, Hartmann-Boyce J et al. (2021) The effects of environmental sustainability labels on selection, purchase, and consumption of food and drink products: a systematic review. *Environ Behav* 53, 891–925.
- De Bauw M et al. (2022) Digital nudges to stimulate healthy and pro-environmental food choices in E-groceries. *Appetite*, Volume 172, 105971, ISSN 0195–6663, <https://doi.org/10.1016/j.appet.2022.105971>.
- <https://omniacion.org/>
- Burrows D (2022) Ecolabels on food - What's happening? Available at <https://www.safefood.net/food-safety/news/eco-labelling> (Accessed on 03/10/22)
- Thøgersen, J. and Nohlen, H., Consumer understanding of origin labelling on food packaging and its impact on consumer product evaluation and choices: A systematic literature review, Ciriolo, E. editor(s), EUR 31208 EN, Publications Office of the European Union, Luxembourg, 2022, ISBN 978–92–76–56613–7, doi:10.2760/336778, JRC126893.
- European Commission, Directorate-General for Health and Food Safety, Market study on date marking and other information provided on food labels and food waste prevention: final report, Publications Office, 2018, <https://data.europa.eu/doi/10.2875/808514>
- FAO, 2011. Food Wastage Footprint Impacts on Natural Resources. Retrieved from: <http://www.fao.org/3/i3347e/i3347e.pdf>.
- Broderick, S., Gibson, C., 2019. Reducing Commercial Food Waste in Ireland. http://www.epa.ie/pubs/reports/research/waste/Research_Report_282.pdf.
- Flanagan A & Priyadarshini A (2021) A study of consumer behaviour towards food-waste in Ireland: Attitudes, quantities and global warming potentials. *Journal of Environmental Management*, Volume 284, <https://doi.org/10.1016/j.jenvman.2021.112046>.
- Government of Ireland, 2019. Climate Action Plan (September 1, 2019). <https://www.dccae.gov.ie/en-ie/climate-action/publications/Pages/Climate-Action-Plan.aspx>.

NEW NUTRITION & YOU BOOKLET - MENOPAUSE

Developed by the National Dairy Council and endorsed by the Irish Nutrition and Dietetic Institute, the Nutrition & You booklet series highlights the importance of a balanced diet across the life stages. Our latest booklet covers diet and Menopause and free copies are available to download from www.ndc.ie or order by contacting nutrition@ndc.ie



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Mission:

To deliver real and unique value to Irish dairy farmers by protecting and promoting the image, quality, taste and nutritional credentials of Irish dairy produce to a wide variety of audiences in a clearly defined, focused and effective manner.

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Mission:

To leverage the world-class capabilities of the Irish academic partners, with the market expertise of the industry partners, into a pipeline of innovative, nutritional functional ingredients/products for the global food industry.

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