



# Sustainable Healthy Diets: Missing Pieces of the Puzzle

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## Abstract

Climate change has become a prominent topic in the media. There is clear evidence that an increase in greenhouse gases is causing global warming, above what is typical, which is resulting in more extreme weather events. It is estimated that the food system accounts for up to one-third of the total emissions produced globally, therefore, urgent changes are required. In addition, the food system is providing unhealthy diets for many. A sustainable diet must address environmental, social, economic, and health-related challenges. Dietary change is one solution to making diets more sustainable, including increases in fruit and vegetables, legumes, nuts and seeds, and whole grains and decreases in ruminant meats and discretionary foods. Food-based dietary guidelines will be an important policy tool in communicating these changes to the population, however, to date the messages are inconsistent. Experimental data are lacking and will be required to fully assess the effectiveness and safety of sustainable diets. The MyPlanetDiet study will help address these gaps and make an important contribution to the development of sustainable guidelines both in Ireland and globally.

*Keywords: sustainable diets, greenhouse gas emissions, healthy diets, food based dietary guidelines.*

## Setting the Scene

Over the past decade, the impact of climate change caused by greenhouse gas emissions (GHGE) has become a prominent topic in the media. The Intergovernmental Panel on Climate Change (IPCC), a group of experts who provide scientific information for the development of climate policies, conclude in their latest reports that the actions of humans are responsible for climate change. Greenhouse gases such as carbon dioxide trap heat from the sun, causing a “greenhouse” effect, which warms the earth and creates conditions that are suitable for life. However, an increase in GHGEs has caused warming above what is needed. As a result, many regions are experiencing unusual weather events, and often those most vulnerable are worst affected.

It is estimated that the food system accounts for up to one-third (21-37%) of GHGs (Source: IPCC). This includes emissions at each stage of the food system, spanning from agriculture to human consumption and waste. Half of these emissions occur on the farm, where the production of animal products such as meat makes up the majority. Not only are emissions produced by the animals throughout their lifespan, emissions are also produced indirectly through actions such as the clearing of ecosystems to produce land for raising animals and growing feed. Ruminant animals like cattle and sheep produce the highest emissions due to the process of fermentation in their digestive system, which creates a potent greenhouse gas called methane.

Food is an essential part of life, providing nutrients required for optimal health. However, a substantial proportion of the population are not consuming a healthy diet. For some, this is not a choice, where affordability and accessibility are common barriers. However, as countries become wealthier and more urbanised, diets tend to move towards a higher consumption of animal products and ready-to-eat, ultra-processed foods which are highly palatable. Therefore, educating people on how to eat a healthier and more sustainable diet is one way in which GHGs can be reduced

The United Nation's (UN) Sustainable Development Goals (SDGs) are a call to action for countries to improve the livelihoods of both their people and the planet. Food is central to many of the 17 goals, in particular goal 2 (zero hunger), goal 3 (good health and wellbeing), goal 12 (responsible consumption and production), goal 13 (climate action), goal 14 (life below water) and goal 15 (life on land). In addition, the Paris Climate Agreement aims to limit the rise in global temperature to well below 2°C above pre-industrial levels. These international targets are putting pressure on the food system to deliver more sustainable diets.

## What is a Sustainable Diet?

In 2010, the Food and Agriculture Organization of the United Nations (FAO) defined sustainable diets as being “protective and respectful of biodiversity and ecosystems, culturally acceptable, accessible, economically fair and affordable; nutritionally adequate, safe and healthy; while optimizing natural and human resources”. In a few short lines, this definition encompasses all aspects of the food system, and translating this into practice will be extremely challenging.

Food emissions are usually reported as carbon dioxide equivalents (CO<sub>2</sub>e), known as the Global Warming Potential, which combines the different GHGs into one measurement unit. Using this unit, it is clear that animal foods make a bigger contribution to emissions compared with plant-based foods. For example, a global review by Clune et al. found that the production of one kilogram of beef produces over 40 times more CO<sub>2</sub>e compared with one kilogram of legumes. Hence, a reduction in animal products is one way in which GHGs could be reduced.

In 2019, the EAT-Lancet Commission published a diet that is deemed to be healthy for both people and the planet. This was the first attempt at defining a more sustainable diet for the

world, and importantly involved a group of 37 experts from different scientific backgrounds. This group defined quantitative targets for different food groups, that will deal with projected population growth, eliminate approximately 11 million deaths per year, and remain within the safe operating limits of natural resources. As shown in figure 1, the diet is dominated by plant-based foods and includes lower than typical amounts of animal foods.



Figure 1: The EAT-Lancet Commission's Planetary Health Diet (Source: [www.eatforum.org](http://www.eatforum.org)).

The British Nutrition Foundation performed a review of studies from high-income countries, to find the common recommendations bring reported in sustainable diets. The following findings were consistent: increases in fruits, vegetables, cereals and potatoes, nuts and seeds, and legumes; and decreases in meats, alcoholic and non-alcoholic beverages, and foods high in salt, sugar, and fat. Interestingly, results were inconsistent for milk, yogurt, eggs, and oils.

There has been progress in the development of more sustainable diets, however, these diets are mostly based on modelling of dietary data and have not been tested in a real-life experimental setting. It is still not clear where foods like dairy and eggs sit, when provision of nutrients is considered in addition to the impact on the environment. Dietary intervention studies in humans are required to help refine these recommendations.

## Could Sustainable Diets Negatively Impact Health?

Animal foods are dense in protein and micronutrients such as iron, vitamin B12, calcium and zinc. Therefore, there is a concern that reducing intakes of these foods could have adverse effects on health. Protein, which is important for growth, repair, and maintenance of muscle

mass, is made up of 20 amino acids. Of these, nine are considered “essential” as they cannot be produced by the body and must be obtained from the diet. Animal foods contain all nine essential amino acids in similar amounts needed by our body, therefore, these are considered to be better quality sources. In the Irish diet, around 60% of protein is supplied by animal foods. If intakes of animal foods are reduced, this may adversely impact protein intakes. However, by consumed a varied diet with different combinations of plant-sources, it is possible to supply all essential amino acids in adequate amounts in the same meal e.g., beans on toast or rice with lentils.

Vitamin B12, which is required for healthy red blood cells and nerve function, naturally occurs in animal foods only. Therefore, there may be a risk to the population if the intake of animal foods is reduced. However, vitamin B12 (and other nutrients) can be added to foods, through a process known as fortification. This provides an opportunity for sufficient intake of vitamin B12 through foods, rather than depending on supplementation. Iron is important for the production red blood cells, which carry oxygen around the body. Inadequate intakes can result in iron deficiency anaemia. Iron has two forms, heme found in animal foods and non-heme found in both plant and animal foods. Although heme iron makes up a relatively small proportion of iron intake (around one fifth), it is more easily absorbed by the body. Women of reproductive age have higher requirements for iron, due to losses caused by menstruation and pregnancy. The latest Irish dietary survey found that 61% of women aged 18-50 years had inadequate iron intakes. Therefore, when intakes of nutrients like iron are already low, there is a concern that intakes could be further negatively impacted by reduced animal food intake, if not replaced with equivalent plant-based foods.

These concerns must be assessed in dietary intervention studies in different population groups. The outcomes of such experiments will better inform the composition of diets and may lead to certain trade-offs between emissions and provision of nutrients, especially in more vulnerable groups such as young women.

## Food Based Dietary Guidelines

Pyramid. These dietary guidelines will be the vehicle used to inform people on how to eat a more sustainable diet. Traditionally, dietary guidelines were based on evidence linking diet and health. This is starting to change, and recently, several countries have incorporated sustainability considerations. However, some of the guidelines published to date have vague sustainability messages that may be confusing. Countries such as Brazil and Qatar mention sustainability, however, no quantitative recommendations on food intake are provided. Focusing on red meat intake, the Swedish guideline is in line with recommendations for health at 500g/week, much higher than recommended by the EAT-Lancet Commission. Whereas, the Danish guidelines, which were developed using dietary modelling based on the EAT-Lancet guidelines, recommend consuming around 350g of total meat per week and limiting beef and lamb to “make a difference for health and climate” which sends out a much clearer message.

A review conducted by the FAO found that only 83 out of 215 countries had national guidelines in place. This provides an opportunity for both health and sustainability to be included from the beginning, however, clearer recommendations are needed, with evidence on the effectiveness and safety of sustainable diets underpinning decisions.

## The MyPlantDiet Study

The MyPlanetDiet Study is a first-of-its-kind dietary intervention which aims to investigate if a new sustainable diet, can reduce greenhouse gas emissions (GHGEs), meet nutritional requirements, and promote health. This study, being conducted as part of the SuHeGuide project (Sustainable and HEalthy dietary GUIDELines), will help address the gaps in experimental evidence identified in the area of sustainability, and the results will be considered for development of public policy in Ireland.

This is a multi-centre study, where University College Cork is one of three recruitment sites, led by Principal Investigator Professor Mairead Kiely. We aim to recruit 120 healthy omnivores at each site. The study design chosen is the gold standard method for experimental studies, known as a randomised controlled trial (RCT). An RCT is a study in which participants are randomly assigned to one of two groups, where one is known as the intervention group (sustainable diet) and the other is known as the control group (standard healthy diet). Neither the investigator nor the participant chooses the diet they are assigned to. This random assignment reduces bias, ensuring that each participant has an equal chance of receiving the intervention diet. This creates two comparable groups which are similar in key factors that may influence the results, except for the intervention itself. The intervention will be provided in the form of dietary recommendations, which have been developed by the SuHeGuide team. The study will collect information on the participants' diet, nutrient and health status, body measurements and motivations at the beginning (baseline) and end (endpoint) of a 12-week period. The changes between baseline and endpoint will be analysed to determine if the sustainable diet was successful at reducing GHGEs and meeting nutritional needs.

## Conclusion

Reducing GHGEs is one of the most important challenges of our time. Dietary change is one way in which GHGEs can be reduced, making an important contribution to the UN's SDGs and the Paris Climate Agreement. Dietary guidelines are lacking clear recommendations on how to eat more sustainably. In addition, there has been an explosion in the availability of plant-based alternative convenience products on the food market. Studies have shown that these foods are becoming common components of plant-based diets, in place traditional plant-based foods such as legumes and pulses. Although these foods can help bridge the gap for those wanting to reduce meat in their diet (e.g., by creating a similar eating experience), the impact of these foods on both health and environmental outcomes must be explored further. There are many synergies between health and environmental sustainability, however, the missing piece of the

puzzle is experimental evidence. If there is to be sufficient progress in the development of more sustainable diets, it is vital that a body of evidence is published in a range of different socio-demographic settings. The MyPlanetDiet study will make an important contribution to the development of healthy sustainable guidelines both in Ireland and globally.

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### **Declaration of Interests**

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