

# Health implications of adopting nutritious, low-carbon diets in the UK



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## Objective

- To design diets for the UK population that are plausible, conform to nutritional guidelines and reduce greenhouse gas emissions (GHGEs), and to quantify the health impacts associated with these diets.

## Methods

- We used data from the National Diet and Nutrition Survey (NDNS), and a Life Cycle Analysis (LCA) of GHGEs to calculate the emissions associated with current average diets in the UK.
- We then optimised these diets using linear programming so that they conformed to World Health Organization (WHO) nutritional guidelines while minimising deviation from the current diet and reducing the GHGEs associated with the diet.
- We assessed the changes in Quality Adjusted Life Years (QALYs) from mortality and morbidity from coronary heart disease, stroke, cancer and type II diabetes if the optimised diets were adopted.

## Results

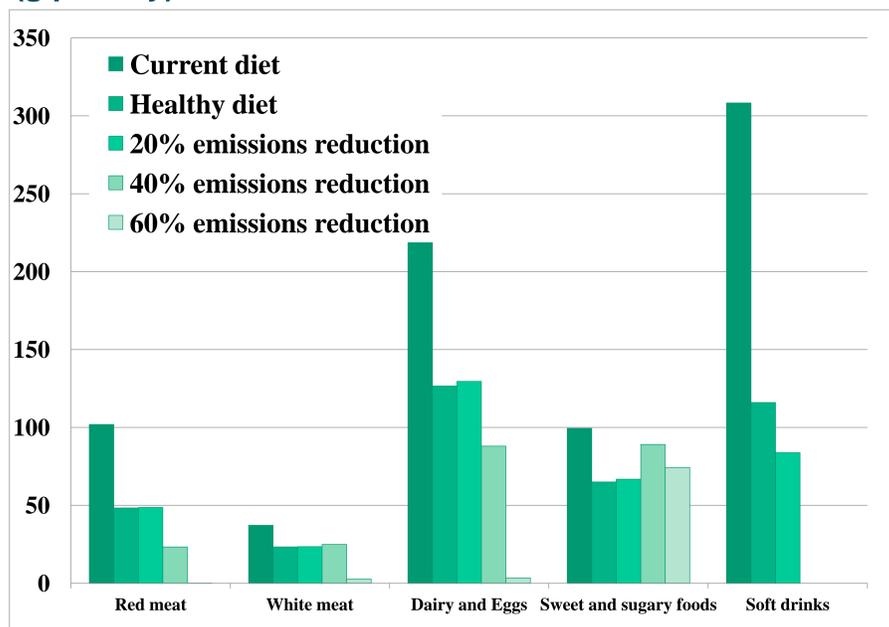
- The current average diet among adults does not conform to WHO guidelines in most respects (Table 1). It exceeds dietary recommendations for saturated fat, protein and sugar (and too much salt for men), and does not meet recommendations for polyunsaturated fat, carbohydrate or fruit and vegetables.

**Table 1: Nutritional composition of current UK average diet for males and females compared to WHO guidelines**

Nutrient	WHO guideline	Current male diet	Current female diet
Total fat (% energy)	15-30	33	34
Saturated fat (% energy)	<10	12	13
Polyunsaturated fat (% energy)	6-10	5.8	5.1
Trans fats (% energy)	<1	0.7	0.7
Carbohydrates (% energy)	55-75	44	46
Free sugars (% energy)	<10	12	11
Protein (% energy)	10-15	16	17
Sodium (g)	<2	2.6	1.9
Fruit and vegetables (g)	≥400	285	288

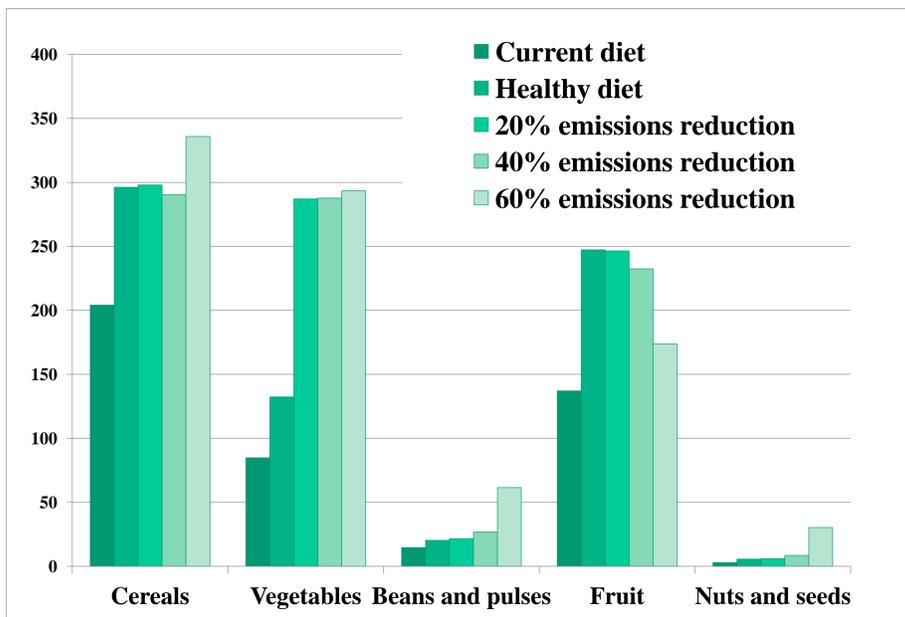
- When we optimised the diets to comply with WHO guidelines, an incidental reduction in GHGEs of 17% was achieved.
- Further reductions in GHGEs were achieved by modifying the average diets so that they contained fewer animal products and processed snacks and more fruit, vegetables and cereals (Figures 1 and 2 show these results for men – results for women were similar).
- Dietary changes up to a 40% reduction in emissions were not too extreme (up to a 50% deviation from the current diet for men, and a 40% deviation from the current diet for women). However, beyond a 40% reduction in emissions the diets became largely vegan and much less diverse (with up to a 200% deviation for men and a 150% deviation for women).

**Figure 1: Optimised diets for men – fatty and sugary foods (g per day)**



- Our health impact models showed that even the 'healthy diet' model that was not designed explicitly to reduce emissions resulted in a saving of around 8 million QALYs, mostly due to reduced mortality and morbidity from coronary heart disease.
- Health benefits largely continued to increase as the GHGEs in the diet were reduced, but the 60% GHGE reduction scenario showed a tailing off of benefits, most likely because fruit began to be reduced in this diet.

**Figure 2: Optimised diets for men – staple foods (g per day)**



## Conclusions

- There are large potential co-benefits to health and nutrition from adopting diets with lower associated GHGEs.
- However, the nutritional value and acceptability of these diets is likely to peak at a reduction in GHGEs of around 40% for a country like the UK.
- In the absence of major changes in dietary preferences, any additional reduction in emissions from food will have to come from other means such as waste reduction and increased production efficiency.