Food Policy xxx (xxxx) xxx–xxx

Contents lists available at ScienceDirect

Food Policy

journal homepage: www.elsevier.com/locate/foodpol

Unsustainable dietary habits of specific subgroups require dedicated transition strategies: Evidence from the Netherlands

C. van Dooren[a,*], C. Keuchenius[b], J.H.M. de Vries[c], J. de Boer[d], H. Aiking[d]

[a] Netherlands Nutrition Centre (Voedingscentrum), The Hague, The Netherlands
[b] Motivaction Research and Strategy, Amsterdam, The Netherlands
[c] Wageningen University and Research Centre, Human Nutrition, Wageningen, The Netherlands
[d] Institute for Environmental Studies, VU University, Amsterdam, The Netherlands

ARTICLE INFO

Keywords:
Sustainable diets
Consumer research
Greenhouse gas emissions
Diet-quality scores
Transition strategies

ABSTRACT

This paper aims to identify changes in food group consumption that may improve both health and sustainability scores of low-scoring population subgroups. As a case study, we assessed the impacts of the diets of a representative sample of Dutch consumers (age 18–75 y, n = 1242). The health impact of their diets was assessed using the Dutch Healthy Diet-index (DHD) and the environmental impact by greenhouse gas emissions (GHGEs). As expected, a significant negative correlation was found between DHD and the GHGEs, indicating that health and sustainability can, to some extent, be improved in synergy with one another. Looking at population subgroups, (young) employed males were identified as an important target group (lowest DHD and highest GHGEs). Four food groups and energy were observed of which a reduced intake makes a diet healthier and more environmentally sustainable: meat, energy, cheese, snacks (cakes, pastry, biscuits, salted and fried snacks, potato chips), and alcohol. Besides, three food groups were observed of which an increased intake makes a diet healthier, but less environmentally sustainable when they do not replace other food groups: fruit, fish, and vegetables. Based on real-life differences in dietary patterns, four transition strategies were formulated that can raise the DHD and lower GHGEs: (I) Replacing snacks with fruit, especially between meals, (II) Replacing cheese with vegetables, during lunch as well as dinner, (III) Partly replacing meat with fish, (IV) Lowering the total energy intake, through reducing the consumption of alcoholic drinks. If deriving the highest environmental gain is the purpose of dietary adjustment, then halving the portions of meat consumed is a strategy (V). Actual unsustainable diet practices of specific subgroups require dedicated transition strategies. The study provides insights into the opportunities for improving both health and environmental sustainability scores of different population subgroups and underlines that these cannot be successfully achieved by adopting a single strategy.

1. Introduction

The food system contributes significantly to global greenhouse gas emissions (GHGEs). Reducing meat consumption is central to many of the scientific debates on healthy, sustainable diets because of the high environmental impact of meat production (Macdiarmid et al., 2016). Garnett (2011) argued that technological improvements, while essential, will not be sufficient in reducing GHGEs. Hence, if we all have to eat, while keeping within required emissions limits, then we will have to eat differently (Garnett, 2011). Public health is another reason to consider some urgent diet changes among large parts of the population in Western countries (Mertens et al., 2016). Given the inseparable environmental and health impact of dietary habits, integrating health and environmental sustainability goals has become a highly topical issue in policy development and communication to encourage consumers to adopt healthier and more environmentally sustainable diets (Van Loo et al., 2017). Although much has been written about the necessity to reduce meat consumption in high meat-eating countries, clear options for implementation are lacking. Moreover, the topic of meat consumption should not be isolated from other consumption patterns in a heterogeneous population of consumers. Therefore, the present study aims to assess how public health institutes may offer guidance to a heterogeneous population of consumers in order to stimulate diet options that are healthier and at the same time more environmentally sustainable, thereby creating an optimal synergy between various options (van Dooren et al., 2014).

One of the main ideas behind the study is that diet changes will be easier to implement and maintain if consumers are enabled to adopt a

* Corresponding author at: Bezuidenhoutseweg 105, 2594 AC The Hague, The Netherlands.
E-mail address: dooren@voedingscentrum.nl (C. van Dooren).

https://doi.org/10.1016/j.foodpol.2018.05.002
Received 11 May 2017; Received in revised form 26 March 2018; Accepted 12 May 2018

diet that is convincingly healthier and more environmentally sustainable but not much different from their current one, for instance, due to correspondences in ingredient sourcing, meal ideas, culinary skills and social expectations (de Boer and Aiking, 2017, Masset et al., 2014, Mithril et al., 2012, van Dooren and Aiking, 2016). The approach chosen here is to develop diet quality scores for health and environmental sustainability that can be used to identify low-scoring population subgroups, to model the impacts of particular diet changes and to specify which changes in food group consumption may optimally improve the current health and environmental sustainability scores of low-scoring population subgroups. Van Dooren et al. (2017b) proposed a Sustainable Nutrient Rich Foods index that can assist in rating food products (Van Dooren et al., 2017b). The index represents seven key nutritional characteristics. The basic idea is that products lower in metabolic energy density, with less saturated fatty acids, and less sodium and added sugar, and products higher in plant protein, essential fatty acids and dietary fibre contribute simultaneously to a diet with lower greenhouse gas emissions (GHGEs) and a higher health-related nutritional impact. Building on these insights, it is possible to develop strategies to make consumer's diets simultaneously healthier and more environmentally sustainable.

Recent studies in high income countries suggest that, in the general population, diet-quality scores for health and environmental sustainability may be positively correlated (Aleksandrowicz et al., 2016; Biesbroek et al., 2014, Buchner et al., 2010, Mertens et al., 2016, Temme et al., 2015, van Dooren et al., 2014). For instance, Aleksandrowics et al.'s review reveals that environmental and health benefits are possible by shifting from Western diets to a variety of more sustainable dietary patterns. The 14 diets they identified showed 20–30% lower than median GHGEs and land use (Aleksandrowicz et al., 2016). However, these studies were mostly based on hypothetical scenarios. Moreover, the correlation found between diet-quality scores for health and environmental sustainability does not mean that dietary changes proposed to improve environmental sustainability scores will inevitably improve health scores (and vice versa). A recent review by Payne et al., based on sixteen relevant studies, concluded that a significant percentage of the dietary patterns with lower GHGEs than average was associated with lower nutritional quality or health outcomes (Payne et al., 2016). One of the explanations is that diets with reduced GHGEs that are low in animal foods are often high in sugar and low in essential micronutrients (Payne et al., 2016). This underlines that it is crucial to consider realistic data on the food choices made by different population subgroups (see also Apostolidis and McLeay, 2016), In the context of public health policy, these subgroups should preferably be identifiable by policy makers by demographic and social variables (sex, age, education, employment, social milieu, etc.).

As a case study, we used data of a nationwide sample in the Netherlands, which provided insight into the daily food choices made by different population subgroups. The health-related nutritional impact of diets was operationalized using the Dutch Healthy Diet-index (DHD). This healthy diet score consists of ten components representing the Dutch Dietary Guidelines (van Lee et al., 2013). Environmental impact was operationalized by estimating GHGEs of diets. GHGEs can be seen as a proxy, representative for other environmental sustainability indicators, such as land use and energy use (van Dooren et al., 2017a). In line with earlier work, it was expected that diets of subgroups with high healthy diet scores (DHD) and high nutritional quality would also give low GHGEs. To identify potentially relevant diet shifts:

1. First, we analysed what subgroups had a higher or lower than average DHD and lower or higher than average GHGEs.
2. Second, we determined what nutritional components of the DHD would make the (Dutch) diet both healthier and more environmentally sustainable.
3. Third, we identified what changes in consumption would make the diet both more nutritious and more environmentally sustainable.

Based on the foods consumed by the subgroups, we identified which specific transitions in food choices these groups can make to increase the DHD and decrease the GHGEs of their diet at the same time. Finally, based on the Dutch example, we developed general policy recommendations regarding European strategies to support the transition towards more environmental sustainable diets with higher nutritional quality.

2. Methods

2.1. Population sample

Consumer research was conducted in 2015 among a representative sample of Dutch consumers, sourced through an online panel that was organized by the Motivaction research agency (Lampert, 2014). 4796 persons in the age range 18–75 years were invited to participate, of whom 1249 (26%) completed the questionnaire. The socio-demographics and the classification of the panel in social milieus had been collected for other studies and were already available. The sample was weighted to be representative for age, sex, level of education, region, value-orientation and interactions between these variables. Seven extremely high scoring consumers were left out the statistical analyses in order to get a normal distribution of the calculated GHGEs, resulting in a sample of 1242 consumers.

2.2. Online questionnaire

The sample received a 15-min online questionnaire consisting of 72 questions about actual food and beverage consumption and eating behaviour. The questionnaire combined two validated questionnaires on food frequency (van Lee et al., 2013) and ecological footprint (van Dooren and Bosschaert, 2013).

The questionnaire included the Dutch Healthy Diet Food Frequency Questionnaire (DHD-FFQ; 2013, August 27, 43 questions). This FFQ was developed using data from two 24 h recalls. The DHD has been found useful to evaluate diet quality in Dutch adults and as a monitoring tool in public health research (van Lee et al., 2013). Sixteen questions about the ecological footprint of the diet were asked (of which 6 were already covered by the DHD-FFQ (van Dooren and Bosschaert, 2013)). Besides four extra food frequency questions (i.e. soft drinks, coffee, tea, and water), it contained questions about seasonality and origin of vegetables and fruits; types of meat consumed (beef, pork, chicken, no meat); protein-rich meat substitutes; cooking habits; shopping habits; and food packaging.

The questionnaire included also questions about height and body weight, in order to calculate the Body Mass Index (BMI) of the respondents. The formula for BMI is weight in kilograms divided by height in meters squared. BMI is high if the value is 25 kg/m^2 or more (overweight).

Furthermore, the questionnaire contained 19 questions about food waste and environmentally sustainable behaviour, which are not reported here. Due to time limitations, we did not include questions on value orientations, but used a segmentation classification that was already available about the participants (http://xs.motivaction.nl/onderzoek/mentalitytest). Appendix A gives a schematic overview of