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## Socio-demographic and attitudinal determinants of nutrition knowledge of food shoppers in six European countries

Klaus G. Grunert<sup>a,\*</sup>, Josephine Wills<sup>b</sup>, Laura Fernández Celemín<sup>b</sup>, Liisa Lähteenmäki<sup>a</sup>, Joachim Scholderer<sup>a</sup>, Stefan Storcksdieck genannt Bonsmann<sup>b</sup>

<sup>a</sup> MAPP Centre for Research on Customer Relations in the Food Sector, Aarhus University, Denmark

<sup>b</sup> European Food Information Council, Rue Paul-Emile Janson 6, 1000 Brussels, Belgium

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### ABSTRACT

Nutrition knowledge is a prerequisite for processing nutrition-related information when making food choices. Insight into determinants of nutrition knowledge is important both for designing measures aimed at increasing levels of nutrition knowledge and for food industry attempting to position food products based on their nutritional properties. Shoppers recruited in the UK, Sweden, France, Germany, Poland and Hungary (total  $n = 5967$ ) filled out a questionnaire measuring their nutrition knowledge with regard to dietary recommendations, sources of nutrients, and calorie content of food and drink products. Differences in the level of knowledge found were related to country, socio-demographic characteristics, attitude to healthy eating, and use of different sources of nutrition knowledge. Results showed that nutrition knowledge is multi-dimensional, with especially knowledge on calorie content being unrelated to the rest. Attitude to healthy eating and use of different information sources were weakly but significantly related to level of nutrition knowledge. Direct effects of socio-demographic characteristics were stronger, and inter-country differences were pronounced, with highest scores for the UK, suggesting that the history of health policies and nutrition-related initiatives taken by retailers and manufacturers, together with cultural differences, are a major factor affecting how people acquire knowledge about food and health.

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### 1. Introduction

Food products are increasingly positioned by their nutritional properties. This development is in response to increasing consumer interest in healthy eating, to a stream of public policy measures encouraging healthy eating, and to an extensive debate in the public domain on the importance of healthy eating and the difficulties in putting together a healthy diet. As a consequence, most food products in Europe contain some nutritional information (Storcksdieck genannt Bonsmann et al., 2010), sometimes hidden on the back, but often prominently displayed on front of the pack by various forms of nutrition labelling, health symbols, nutrition claims and other, softer ways of communicating nutritional properties of the food.

In order to be able to process nutrition-related information when making food choices, food shoppers need a certain level of nutrition knowledge. This means that shoppers need to be aware of nutrition recommendations and basic food-based guidelines. They should also be able to apply this knowledge in their food choices and eating behaviour (Sapp & Jensen, 1997). Many studies

have reported a positive association between nutrition knowledge and healthful food behaviour (Dallongeville, Marécaux, Cotel, Bingham, & Amouyel, 2001; Handu, Monty, & Chmel, 2008; Klohe-Lehman et al., 2006; Lee, Lee, Chang, & Kim, 2009; Wardle, Parmenter, & Waller, 2000). Understanding the differences in level of nutrition knowledge between shoppers and their determinants will be helpful both for public policy, aiming to design measures to increase shoppers' level of nutrition knowledge, and for industry, aiming to market and target food products based on these products' nutritional properties.

In the present study, we focus on the determinants of the level of nutrition knowledge. Previous studies on determinants of level of nutrition knowledge have looked mainly at socio-demographic (age, living situation, educational level, occupation, having children, country of residence) and lifestyle (physical activity, Body Mass Index (BMI)) determinants of nutrition knowledge (De Vriendt, Matthys, Verbeke, Pynaert, & De Henauw, 2009; Drichoutis, Lazaridis, & Nayga, 2005; Kersting et al., 2008). Results suggest that women and people with higher education levels have more nutrition knowledge (De Vriendt et al., 2009; Hendrie, Coveney, & Cox, 2008). Also age has been positively linked to the level of nutrition knowledge (De Vriendt et al., 2009; Hendrie et al., 2008; Wardle et al., 2000). However, studies on the direct effect

\* Corresponding author. Tel.: +45 89486439; fax: +45 86153988.

E-mail address: [klg@asb.dk](mailto:klg@asb.dk) (K.G. Grunert).

of socio-demographic and lifestyle factors on nutrition knowledge give no direct indications on why such relationships exist. As an example, higher education may facilitate learning of nutrition knowledge, but may also result in that people become more motivated to eat healthily, which can result in more efforts to acquire nutrition knowledge. Also the effects of other socio-demographic variables are open to different interpretations. It is therefore important to understand if and how the effect of socio-demographic factors on nutrition knowledge is mediated by attitudinal variables, especially attitude to healthy eating. For example, women and older age groups are known to be more health conscious (Dean et al., 2007; Rozin, 1999) and more interested in healthy eating (Roininen, Tuorila, Zandstra, De Graaf, & Vehkalahti, 2001), which in turn could result in them acquiring more nutrition knowledge. Different socio-demographic groups may also differ in their use of different potential sources of nutrition information, which in turn can lead to different levels of knowledge. Finally, country of residence can be expected to have an effect on level of nutrition knowledge, as different countries have followed different policies, differ in information sources available, and in the degree to which industry and the retail sector have embraced nutritional properties of food products as a competitive parameter.

Studies on differences in level of nutrition knowledge are complicated by the fact that the construct 'nutrition knowledge' is not clear. Sapp and Jensen (1997) reviewed the literature on previous assessments of nutrition knowledge and found that they typically contain questions related to basic nutrition knowledge, the ability to recall nutrient content of foods and the source and form of nutrients present in foods. Recently, the most frequently used or adapted scale for measuring nutrition knowledge is the nutrition knowledge questionnaire developed and validated by Parmenter and Wardle (1999), where nutrition knowledge was divided into five subscales: understanding of terms, awareness of dietary recommendations, knowledge of foods as sources of nutrients, ability to apply information in choices and awareness of diet-disease associations. While these scales are often analysed as one nutrition knowledge scale, it is conceivable that nutrition knowledge has several, only loosely correlated dimensions, and that the determinants of level of nutrition knowledge differ between these dimensions. Understanding the dimensionality of the nutrition knowledge construct is hence a prerequisite for understanding its determinants.

## 2. Aim of study

Based on the above, the aims of this study are as follows:

- To analyse the internal structure of nutritional knowledge by distinguishing different dimensions of nutritional knowledge and analysing their interrelatedness;
- To analyse how socio-demographic variables (including country of residence), attitude to healthy eating and use of different information sources affect nutrition knowledge;
- To analyse to which extent socio-demographic variables affect nutrition knowledge directly or indirectly via their effect on attitude to healthy eating or use of information sources.

The conceptual model guiding the study is shown in Fig. 1.

## 3. Materials and methods

The study was carried out in six countries: UK, Sweden, France, Germany, Poland and Hungary. The selection of countries was based on a number of criteria. The UK was selected as a country where nutrition and healthy eating have received wide public attention in recent years, with widespread presence of nutrition and health campaigns, and where the population's awareness of

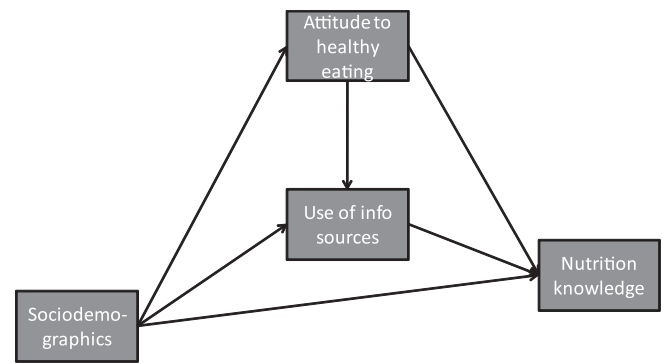


Fig. 1. Conceptual model.

nutritional issues hence can be expected to be high. Sweden, France and Germany were selected because of cultural diversity in terms of food and meals. Poland and Hungary were included in order to have a representation of central Europe. Country differences in nutrition knowledge were expected, due to different national and cultural interests in food, different levels of exposure to nutrition labelling information, and different levels of exposure to information from diet and health campaigns.

The present study deals not with the population at large, but only with those who go shopping for food, as these are the people who make decisions where nutrition knowledge may have an impact on the healthiness of the household's dietary intake. For this reason, respondents were recruited in supermarkets after having selected a product(s) at one of six different aisles (breakfast cereals, yoghurts, ready meals, soft drinks, salty snacks, confectionery), which were chosen based on differences in overall health image and availability of nutrition information on food labels. After having made a selection, shoppers were approached and asked if they would participate in a short interview. In this interview, socio-demographic details were recorded and shoppers were interviewed about aspects of the choice they had just made (this part of the study is not relevant for the present paper, and results are reported elsewhere (Grunert, Fernández-Celemín, Wills, & Bonsmann, 2010; Grunert, Wills, & Fernández-Celemín, 2010)). At the end of the short in-store interview, they were asked if they would complete a further questionnaire at home and then return it. Socio-demographic information collected in the in-store interview included age, gender, and whether respondents had children under 16. Social grade was measured in all countries according to the UK National Statistics Socio-economic Classification (NS-SEC) system for the respondent household's chief earner. Categories 2 and 3 of that system were subsequently collapsed due to low numbers in category 3 (small employers and own account workers), resulting in a four-level classification as shown in Table 1.

Respondents received a small monetary incentive for participating in the in-store interview and were offered an additional incentive if they completed a longer questionnaire at home and returned it. The in-home questionnaire contained a section measuring nutrition knowledge, a section with background questions, and a section measuring understanding of nutrition labels. Results on this latter part are presented elsewhere (Grunert, Fernández-Celemín, Wills, Storcksdieck genannt Bonsmann, & Nureeva, 2010a).

Recruitment of participants occurred in major retailers (Tesco, Sainsbury's and Asda in the UK, Intermarché and Auchan in France, Lidl and Real in Germany, Tesco and Interspar in Hungary, Tesco and Real in Poland, ICA, Coop and Axfood in Sweden). In each country, data collection was additionally spread across three geographic locations. The recruitment was done throughout a range of time segments on weekdays and at week-ends. This resulted in a design with 3 retailers × 3 locations × 6 product categories = 54 cells for

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