



Original Research Article

Key foods in Sweden: Identifying high priority foods for future food composition analysis



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ABSTRACT

High quality food composition data are essential in cutting-edge research, for example on diet and health, so regular updates and improvements of food composition data are necessary. However, food analyses are expensive, and for optimal use of resources, tools to aid prioritisation are required. This study sought to identify key foods in the Swedish diet, in order to set priorities for future nutrient analyses of foods. A slightly modified version of the key foods approach developed by the Nutrient Data Laboratory in the United States was used. Existing nutrient values were combined with food consumption data from the national dietary survey *Riksmaten Adults 2010–11*. Key foods were identified group-wise using key nutrients for each food group. Of the 1894 foods included in the survey, 320 (17%) were identified as key foods contributing 75% of intake of the key nutrients in each food group. These key foods will be prioritised in future food composition analyses.

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1. Introduction

A healthy diet is associated with lower risk of chronic diseases, such as cardiovascular disease, type 2 diabetes and cancer (Willett and Stampfer, 2013). The interrelationships between diet and health are complex and require representative and accurate national food composition data. The Swedish food database is frequently used in, for example, epidemiological studies (Couto et al., 2013; Hruby et al., 2013; Kaluza et al., 2013; Michaëlsson et al., 2013; Vergnaud et al., 2013), clinical trials (Öhrvik et al., 2009; Adamsson et al., 2011) and toxicological research (Augustsson et al., 1999; Bjeremo et al., 2013). Food composition data may also be used to assess the need for fortification, to identify food contaminants and to develop dietary guidelines (Williamson and Buttriss, 2007).

In Sweden, the national food composition database is managed by the National Food Agency (NFA). NFA is a member of the European Food Information Resource Network, EuroFIR (Bell et al., 2012) and the food database fulfils the quality parameters set by the network. The predecessor of the current Swedish food database was developed in 1947 by the National Institute of Public Health, and the current version comprises over 2000 foods. For each food, values for up to 160 different food components are available, including

macronutrients, vitamins, minerals/metals and bioactive compounds. These nutrient values are obtained: (I) by analysis using analytical methods accredited by the Swedish Board for Accreditation and Conformity Assessment (SWEDAC); (II) from other food composition databases, scientific publications or the industry; or (III) by imputing from similar foods (NFA and EuroFIR, 2012). In order to make the database more comprehensive, values for some dishes are also calculated according to instructions by EuroFIR (Reinivuo et al., 2009), taking into account uptake and losses of water and fat as well as losses of micronutrients. To improve and update the database, analyses of around 50 foods are performed annually (for example Öhrvik et al., 2010, 2012). The food composition database is available in Swedish and English through a web-based interface (www7.slv.se/Naringssock/) and through FoodEXplorer (www.eurofir.org/foodexplorer/login1.php).

Analysing nutrient profiles is costly. In Sweden, the chemical analyses alone are currently estimated to cost more than €3000 per sample. Therefore, identifying and analysing foods significantly contributing to the Swedish intake of nutrients is crucial for efficient use of analytical resources. One method to set priorities for food analysis is the key foods approach developed by United States Department of Agriculture (USDA) (Haytowitz et al., 1996). This combines data on national consumption of food and beverages with data on existing nutrient composition. A scoring system is applied to rank the foods and identify so-called key foods, defined as foods that contribute to the diet with significant amounts of nutrients of public health interest (Haytowitz et al., 2002). The key

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food approach is used to identify priorities for updating the USDA National Nutrient Database for Standard Reference.

The aim of this study was to identify key foods contributing 75% of intake of relevant nutrients in the average Swedish diet. These food items will be prioritised in future food analysis programmes.

2. Methods

2.1. Food consumption data in Sweden: Riksmaten Adults 2010–11

The most recent national dietary survey in Sweden was *Riksmaten Adults 2010–11* (Amcoff et al., 2012). The participants aged 18–80 years ($n = 1797$) reported everything they ate and drank for four consecutive days, using a web-based food diary (Bjermo et al., 2013). A low participation rate (36%) might have influenced the results. The participation rate was especially low among people having the lowest level of education (14%), among men aged 18–30 years (23%) and among immigrants (27%). Among women all age groups were well represented. About 30% of the foods in *Riksmaten Adults 2010–11* were analysed in Sweden using accredited methods, and nutrient values for about 20% were imputed from similar foods or borrowed from other national food databases, companies or the scientific literature. The values for the remaining foods were calculated from recipes using factors for losses and gains of water and fat, and factors for losses of micronutrients. The calculated foods included prepared foods, such as fried salmon and boiled swede, as well as complete dishes, for example meat pie. Many of those foods were generic food items created from aggregates of different types of the same food. “Ice cream aggregate”, for example, was a blend of several sorts of ice cream.

A total of 1909 food items were included in *Riksmaten Adults 2010–11*. Of these, 15 items were omitted from our calculations as they are normally not consumed on their own or do not provide any nutrients, for example chewing gum, cocoa powder and acetic acid.

2.2. Modified key foods approach

2.2.1. Food groups

Foods were divided into 18 food groups (Table 1) according to how they were consumed and not according to their main

components. For example, pasta was included together with potatoes in a ‘Cereals and Potatoes’ group, instead of with other cereal-based foods in a ‘Breakfast Cereals’ group. The grouping system was similar to that used in *Riksmaten Adults 2010–11* (Amcoff et al., 2012).

2.3. Key nutrients

Instead of using nutrients of current or potential health importance (Haytowitz et al., 1996, 2002), ‘key nutrients’ (Table 2) were used. These were defined as nutrients for which the food group contributed at least 5% of the intake among Swedish adults (Amcoff et al., 2012). In a few cases, a lower limit was accepted. For example, in the ‘Egg and Egg dishes’ group, only three nutrients (retinol equivalents, vitamin E and selenium) exceeded the 5% cut-off limit, and a cut-off of 4% was chosen to include additional nutrients (vitamin B₂, vitamin B₁₂ and vitamin D). According to the latest national dietary survey in Sweden, about 3% of the population are vegetarians (Amcoff et al., 2012), excluding meat and possibly also other animal sources, and a number of vegetarian food alternatives are available on the market. When identifying key foods, all vegetarian food options included in *Riksmaten Adults 2010–11* were divided into suitable food groups, instead of forming a group of their own. For example, soya-based drinks were allocated to the ‘Dairy and Vegetarian Alternatives’ group, falafel and soy products to the ‘Meat, Meat Products and Vegetarian Alternatives’ group and Quorn nuggets to the ‘Poultry, Poultry Products and Vegetarian Alternatives’ group. In all, 33 vegetarian food items (12%) were included in the ‘Meat, Meat Products and Vegetarian Alternatives’ group, 15 (16%) in the ‘Dairy and Vegetarian Alternatives’ group and 2 (5%) in the ‘Poultry, Poultry Products and Vegetarian Alternatives’ group. As a consequence of including those foods, additional key nutrients; calcium, fibre and folate, were added in those food groups.

2.4. Identification of key foods

The total nutrient contribution of a food item was calculated using the formulae of Haytowitz et al. (2002). The procedure for identifying key foods group-wise is presented in Table 3. First,

Table 1
Description of food groups.

Food group	Examples of included foods	Examples of excluded foods
Beverages	Alcoholic drinks, coffee, tea, fizzy drinks	Dairy beverages, fruit and vegetable juices
Bread	Tortilla, crisp bread, hamburger bread, hot dog buns	Cheese crackers
Bread toppings	Cold cuts, cheese, marmalade, liver pâté, peanut butter	Spreads
Breakfast cereals	Porridge, muesli, cereals	
Cereals and potatoes	Potato products, pasta, rice, bulgur, couscous, quinoa	Porridge, muesli, breakfast cereals
Dairy and vegetarian alternatives	Crème fraîche, sour cream, milk, cream, chocolate milk	Sweet dairy, e.g. custard, sweet curd, ice cream, sauce
Egg and egg dishes	Omelettes, boiled egg, fried egg	
Fats and oils	Olive oil, corn oil, butter, margarine, spreads	
Fish and shellfish	Pickled herring, fried salmon, shrimps, crab	Bread toppings, e.g., spreadable fish paste and side dishes, such as seafood- and mayonnaise salads
Fruit, berries and juice	Dried apricots, pineapple, lemon, grape juice	Sweetened preserved fruits
Meat, meat products and vegetarian alternatives	Sausages, beef, falafel, soya mince, Quorn schnitzels	Bread toppings, e.g. salami, liver pâté
Miscellaneous dishes	Pies, pizzas, salads, soups, casseroles, hamburgers	
Other cheeses and vegetarian alternatives	Halloumi, Parmesan cheese, Feta cheese, Camembert and other soft cheeses	Philadelphia cheese, hard cheese
Poultry, poultry products and vegetarian alternatives	Fried chicken, goose roasted	Bread toppings, e.g. sliced turkey
Side dishes and condiments	Mayonnaise salads, gravies, dressings, wasabi, ketchup, pepperoni, capers, fresh herbs, bean salsa	–
Snacks	Nuts, crisps, popcorn, cheese doodles, crackers	–
Sweets	Cakes, buns, sweetened fruits, custard, chocolate, candy	–
Vegetables and vegetable dishes	Cabbage, mushrooms, sprout, lentils and beans	Side dishes, such as wasabi and garden cress

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