Food patterns and dietary recommendations in Spain, France and Sweden

Healthy people, healthy planet.
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Foreword

Food is at the heart of many key environmental issues. Growing, producing and importing food contributes substantially to climate change. It’s a driving force behind habitat and biodiversity loss. And it’s a huge drain on water resources. That’s why helping to develop a sustainable food system for healthy people and a healthy planet is one of our priorities. By making small changes to your diet, you can help the environment – and eat healthily too!

The change in the Western diet – to one that’s high in meat, dairy and processed food – is a recent phenomenon. It’s occurred at the same time as a growth in issues such as obesity, type II diabetes and heart disease. This is not a localised problem: throughout Europe diets are changing, and they’re impacting on people and the planet.

The food we eat affects some of the Earth’s most important and sensitive ecosystems. Practices such as land clearance and land conversion for food and agricultural production endanger wildlife across the world – including orang-utans, armadillos, Iberian lynx and tigers.

Livestock production has the largest impact. Livestock farming leads in most cases to a range of direct and indirect environmental stresses such as habitat conversion, greenhouse gas emissions, eutrophication and soil erosion. Some 306 of the 825 WWF terrestrial eco-regions reported livestock as one of their current threats. With rapidly increasing global demand for food and other renewable resources this number is expected to rise significantly.

WWF’s LiveWell UK project set out to make a first step towards defining a sustainable, healthy diet. We began by adapting the UK government’s advice to society.

LiveWell shows that by reducing but not eliminating animal-based proteins from our diet we can meet recommendations for health and emissions reduction targets for 2020. LiveWell illustrates that our choices must be about balancing the proportions of different foodstuffs in our diet. This flexible approach allows different cultural, religious and individual dietary needs or preferences to be taken into account.

Working together with Friends of Europe, WWF is now applying a similar approach to diets across Europe, through our LiveWell for low impact food in Europe – or LiveWell for LIFE project.

This report is our initial foray into developing a sustainable diet in Spain, France and Sweden. Business as usual is not an option and this is an excellent first step towards a outlining win-win settings for people and planet.

Duncan Williamson
Senior policy officer, WWF-UK

Summary

As part of the LiveWell for low impact food in Europe (LIFE) project, Blonk Milieu Advies (Blonk Environmental Consultants) and Voedingscentrum (Dutch Nutrition Centre) have compiled information on dietary patterns in Spain, France and Sweden. They’ve also looked at what these countries should be eating, according to their national dietary guidelines. This report details the results of their work.

The next stage of the LiveWell for LIFE project will be to develop ideas for more healthy and sustainable diets for each country. This is urgently needed because current dietary habits contribute to climate change and environmental degradation and are having a negative impact on people’s health, leading to irreversible environmental changes and several non-communicable diseases (NCDs).

Both these issues have huge costs to society.

Government food-based dietary guidelines (FBDGs) show people how they can eat a healthy, balanced diet that meets nutritional requirements. FBDGs are often shown in a graphic such as a diet pyramid, plate or wheel and vary between countries depending on their cultural heritage. Spain has the Mediterranean Diet Pyramid; France has a staircase with nine rules (9 repères); Sweden has the Food Circle (Matcirkeln) accompanied by an ideal diet for men and women. The Swedish guidelines also have more detailed advice on quantities people should eat, depending on gender and activity levels.

The next stage of LiveWell for LIFE, which will develop healthy and sustainable diets, requires more detailed information on nutrients. We collected food composition tables and national Recommended Daily Intakes (RDIs) for nutrients. Where national recommendations on key nutrients or energy were not available, those of the World Health Organisation (WHO) or European Food Safety Authority (EFSA) have been used.

Survey data from the pilot countries shows that dietary trends in all three are progressing towards an average Western diet, where people eat a lot of meat, calorie-dense foods and too little fruit, vegetables and legumes. The LiveWell UK Plate® diet shows what people should be eating to be healthier and more sustainable (more plants and certified sustainable foods; less meat and highly processed food). However, current dietary trends indicate that all three countries are far from eating like this. Meat consumption in Spain is the highest with Spanish adults eating on average 163g of meat per day. An optimized diet with respect to Carbon Footprint will contain more plant foods and restore the recommended nutrient content of the national diets.

Unhealthy dietary habits are a strong risk factor for NCDs such as obesity, cardiovascular diseases, type II diabetes and certain types of cancer.

There are significant differences in the prevalence of NCDs between pilot countries. These differences may be related to variations in dietary habits. Some of the economic costs associated with NCDs are summarised in this report. For example, obesity is estimated to be responsible for 2-8% of national healthcare budgets. If current dietary trends continue, these costs will increase even further.

Dietary habits in Spain, France and Sweden urgently need to change if we’re to improve people’s health and achieve a 25% reduction in greenhouse gas emissions by 2050. Already, some studies have shown that eating more healthily goes hand-in-hand with eating more sustainable food.
1. Introduction

Current dietary habits in Europe¹ contribute significantly to climate change. Changing these habits goes hand-in-hand with eating more healthily because sustainable diets contain more fruit, vegetables and other plant foods and rely less on foods with a high climate impact, such as beef and dairy².

Through the LiveWell for LIFE project, WWF and Friends of Europe are working to introduce the concept of healthy and sustainable diets within the EU, starting with three pilot countries – Spain, France and Sweden.

Our pilot project builds on earlier work in the UK, where the Rowett Institute has already developed a LiveWell UK diet² based on the UK’s government’s food-based dietary guidelines (FBDGs). This seven-day diet meets nutritional requirements and achieves a significant reduction in greenhouse gas emissions along the food chain. It is also palatable and realistic.

The European food chain, from farm to fork, is responsible for an estimated 30% of Europe’s greenhouse gas emissions and 20% of its fossil fuel consumption¹. The LiveWell for LIFE project has set a target of a 25% reduction in greenhouse gas emissions from the food chain by 2020, to help meet the European Community’s overall target of a 20% reduction. Studies looking at the contribution of diets in Spain⁵, France⁶ and Sweden⁷ to climate change show that livestock products such as meat and dairy are responsible for a major part of the impact. Replacing these products in part with plant foods can decrease the overall climate impact and improve the nutritional value² of what people eat.

Poor diets are contributing to people’s ill-health. This makes another strong case for changing dietary trends. Unhealthy diets combined with sedentary lifestyles are causing high rates of NCDs⁸ such as obesity, type II diabetes, cardiovascular disease and certain types of cancer. These illnesses impact on people’s well-being and life expectancy – and on national health care budgets.

This report gives an overview of data collected on food consumption patterns, dietary recommendations and diet-related health problems in Spain, France and Sweden.

WWF chose the pilot countries because they represent a variety of diets in Europe and the different levels of ‘policy readiness’ for a change to more sustainable diets. We compare data about actual consumption in these countries with national and international nutritional recommendations (for example, from the Food and Agriculture Organisation and World Health Organisation (WHO) and the UK LiveWell Plate. We also summarise the implications for public health.
2. Food-based dietary guidelines in pilot countries

2.1 Spain

In 2001, Aranceta et al. published the first dietary guidelines for Spain, in the form of a food pyramid. These were based on the findings of a group of Spanish experts (Sociedad Española de Nutrición Comunitaria). The pyramid was updated in 2004. Based on this pyramid, the Fundación Dieta Mediterránea developed the Mediterranean Diet Pyramid (MDP). The advice it contains is supported by the Spanish Ministry of Agriculture, Food and the Environment (Ministerio de Agricultura, Alimentación y Medio Ambiente). This report will focus on the MDP (see Figure 1).

The MDP is general, and doesn’t include any definition of an “ideal diet” for Spanish women or men. There are upper and/or lower limits for the number of servings of many food groups, but apart from wine, the MDP has no advice on portion sizes. The limit for wine, mentioned in the accompanying text, is two glasses a day for men and one for women. The large bandwidth in recommended amounts for the other food groups is challenging for the next phase of the project. The methods used to calculate the LiveWell plates for Spain, France and Sweden need definite boundaries.

There are a large range of options in each of the MDP’s food groups, and some options have more nutritional value than others. Although the MDP recommends wholegrain varieties of bread, pasta and rice, these are not very popular in Spain. Only 6% of all bread consumed is wholegrain, according to a recent survey.

Another format for FBDGs still used in Spain is the New Wheel of Foods (Nueva Rueda de los Alimentos), published by the Spanish Society for Dietetics and Food Science (SEDCA). The wheel (see Figure 2) has six segments representing different food groups. The size of the segments represents the recommended quantity of each food group in a healthy diet, with less preferred foods placed towards the centre in a highlighted section.

Physical activity and water are in the axis of the wheel, emphasising that they are basic requirements for a healthy lifestyle.
2.2 France

The French FBDGs are in the format of a staircase14 (see Figure 3). The National Programme of Nutrition & Health (PNNS)15 set up by the French Ministry of Health and the National Institute for Prevention and Health Education (INPES; Institut National de Prévention et d’Éducation pour la Santé) has defined nine rules (9 repères) to accompany the staircase. Foods people can consume more of are at the top of the stairs, and foods that people should only eat in small quantities are at the bottom. Foods people should eat in limited amounts are shown through a magnifying glass.

Part of the PNNS was to develop these FBDGs16, which are now considered to be the national advice in France. So far, the PNNS has been very successful in communicating the guidelines to the public. By 2005 over 75% of the public health actions planned were accomplished or in progress, particularly those concerning nutrition communication and education17.

Further explanation on healthy choices is given in the form of the nine rules (repères)16:

- Fruits and vegetables: at least five servings a day (80-100g per serving); all forms including freshly pressed juice.
- Dairy: three servings a day (three or four for children and adolescents): for example, one yoghurt (125g), quark (100g), fresh cheese or cottage cheese (80g), cheese (30g) or one glass of milk.
- Starchy foods at each meal according to appetite: these include bread, rusk, cereals and legumes. Products with complex carbohydrates and wholegrain are preferred.
- Meat, fish and eggs: once or twice a day. Fish at least twice a week (100g per serving).
- Fat products: limited (includes butter and cream). Vegetable oils, oily fish and nuts are preferred, as are cooking methods requiring little fat.
- Sweet products: limited.
- Salty foods (prepared foods, meats, crackers, snacks): limited. Not more than 8g of salt a day.
- Water: as much as needed during and between meals. Herbal infusions may be used as an alternative. Tap water is as healthy as mineral water.
- Alcohol: more than two standard glasses for women and three for men (wine, beer, champagne or liquor) increases the risk of certain illnesses.
- Physical activity: the equivalent of at least 30 minutes of brisk walking per day for adults (at least one hour for children and adolescents).

As with Spain, the PNNS guidelines are rather general and leave a lot of room for interpretation. Even using them as restrictions in the linear programming in the next phase of the project is not straightforward because they are not very specific on quantities.

The abbreviated version of the PNNS guidelines mentioned above could suggest that fruit and vegetables are completely interchangeable. However, the more comprehensive guidelines16 recommend eating at least two or three servings of both, and to eat a wide variety to benefit from all their protective components.

The guidelines recommend eating starchy foods according to appetite, which could imply that overeating is fine. Obviously this is not the case, because they are a source of calories. The bandwidth in the amount of servings of meat, eggs and fish could also be problematic. Both nutritionally and environmentally, the difference in impact between seven and fourteen servings of 100g a week is significant. The comprehensive guidelines16 don’t provide additional guidance on quantities, but they recommend lean meat and mention the benefits of oily fish.

The recommended limit for salt in France is high compared to surrounding countries. Many countries have an upper level of 6g (2.4g sodium) a day and WHO has set an upper level of 5g (2g of sodium)18.
The Food Circle does not include water or wine like the Mediterranean Diet Pyramid or the French Stairs, but the Livsmedelsverket’s website gives additional advice on water and other drinks. Within the Food Circle a strong emphasis is given to fruit and vegetables. Interestingly, potatoes and root vegetables are together in one group, in contrast to most other countries where root vegetables are part of the vegetable group. In contrast to the Eatwell Plate and the French Stairs it only shows foods that are suitable for daily consumption, a separate segment for those foods high in sugar and/or fat is missing.

### 2.3 Sweden

The Food Circle in 1992 had seven equal segments (see Figure 4). The graphic doesn’t show quantities people should eat. General advice is to eat at least one portion from each group every day, but it is not necessary to eat equal amounts from each group. Effectively, this means the Food Circle recommends at least three portions of fruit and vegetables, one portion of meat or fish and one portion of dairy per day. People should eat some of the foods in the circle, like butter and cheese, in moderation.

The Food Circle has the following groups. Additional advice from the accompanying leaflet is in brackets:

- **Fruit and berries (juice may be an alternative)**
- **Vegetables, including pulses (choose coarser varieties, vary according to season. Pulses can sometimes replace meat and fish)**
- **Potatoes and root vegetables (most people should eat more of these)**
- **Bread, cereals, pasta, rice (preferably choose wholegrain alternatives)**
- **Fats (spread a thin layer on bread and preferably choose low-fat margarine. When cooking, use soft or liquid cooking fat with a good fatty acid composition)**
- **Milk and cheese (use low-fat cheese and milk products)**
- **Meat, fish and eggs (try to choose lean alternatives. Eat more fish, including the more fatty species)**

In addition to the Food Circle the Livsmedelsverket published advice on actual quantities of food people should eat, known as the Swedish Nutrition recommendations Objectified (SNO). A scientific justification for these recommendations is publicly available. SNO applies to healthy adults of working age who do little or moderate physical activity. Therefore the recommended energy intake is 9.1MJ for women and 10.5MJ for men. Table 2 below summarises SNO’s recommendations (for more details, see Annex I).

SNO verified if the nutritional advice given so far to the general public was adequate. Swedish people used to be advised to eat 500g a day of fruit and vegetables, but they found that for men it should be closer to 700g. Another finding was that low-fat margarine and liquid margarine are necessary to offset saturated fats from meat, cheese and dairy. The limit of 5g of salt a day was impossible to meet, due to high salt levels in bread, cured meat and cheese.

### Table 2: Recommended amounts of foods from SNO (2005)

<table>
<thead>
<tr>
<th>FC Nr.</th>
<th>Group</th>
<th>Recommendation (SNO)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fruits</td>
<td>approx. 250-350 g/d, max. 100 ml fruit juice</td>
</tr>
<tr>
<td>2&amp;3</td>
<td>Vegetables: &gt;2g fibre</td>
<td>125-175g (e.g. broccoli, white cabbage, beans, peas, spinach, carrots, other root vegetables)</td>
</tr>
<tr>
<td>2&amp;3</td>
<td>Vegetables: &lt;2g fibre</td>
<td>125-175g (e.g. lettuce, tomatoes (incl. crushed), cucumber, pepper, onion and mushrooms)</td>
</tr>
<tr>
<td>5</td>
<td>Fats</td>
<td>low-fat margarine, oil, liquid margarine, 5g per slice of bread</td>
</tr>
<tr>
<td>4</td>
<td>Bread</td>
<td>100-200g, 6-8 slices, half should be wholesome (keyhole), 1 slice with meat-based spread (e.g. liver paté), 1 slice with food, 4-6 with margarine)</td>
</tr>
<tr>
<td>7</td>
<td>Meat</td>
<td>1 portion/day, sausage 1 portion/week, 6-7 portions a week including sandwich meat, lean alternatives</td>
</tr>
<tr>
<td>7</td>
<td>Eggs</td>
<td>2-3 portions/week</td>
</tr>
<tr>
<td>7</td>
<td>Sausages</td>
<td>1 portion/month</td>
</tr>
<tr>
<td>7</td>
<td>Liver paté</td>
<td>women: 1 portion/month</td>
</tr>
<tr>
<td>7</td>
<td>Kjöttprodukter</td>
<td>women: 1 portion/month</td>
</tr>
<tr>
<td>7</td>
<td>Fish</td>
<td>2-3 portions/week: 50% oily, 50% lean</td>
</tr>
<tr>
<td>5</td>
<td>Potatoes</td>
<td>1 portion/day</td>
</tr>
<tr>
<td>4</td>
<td>Rice/pasta</td>
<td>4-6 portions/week</td>
</tr>
<tr>
<td>6</td>
<td>Dairy</td>
<td>200-400 ml/day, low-fat milk &amp; yoghurt, milk in coffee and tea included</td>
</tr>
<tr>
<td>6</td>
<td>Cheese</td>
<td>max. 20 g/day low-fat</td>
</tr>
<tr>
<td>8</td>
<td>Leeway</td>
<td>15-14 en%, 1.2-1.6 MJ (~300-400 kcal): savoury snacks, pastries, cakes, ice cream, jam, fizzy drinks, sweets, alcoholic drinks. Sweet foods better than fatty foods</td>
</tr>
</tbody>
</table>

Similar to the Dutch recommendations a leeway of 1.2-1.6MJ is reserved for foods that primarily provide energy, the so-called energy dense foods. People can choose any combination of foods within this group to fill up this leeway as long as they meet all other recommendations. In general, Swedish people eat too many foods from this category. The LiveWell Plate for the UK also contains 22.3% foods high in fat and/or sugar, such as chips, buns and carbonated soft drinks.

The numbering (FC Nr.) corresponds to the segments of the Food Circle. In the table, the groups do not completely correspond with the Food Circle segments – vegetables are divided into two groups depending on their dietary fibre content, for example. The foods mentioned in this list do not meet the Swedish National Recommendations (SNR) on all nutrients, as iron and protein slightly exceed the SNR. This was to make sure women of childbearing age got enough iron. Some foods have the Keyhole symbol (see Figure 5), which means they are healthier options within a food group, for example in the case of bread, meat and dairy. Meat products with the Keyhole label have a maximum of 15% fat.
3. Guidelines and consumption trends

3.1 Consumed quantities in dietary surveys

3.1.1 Spain

Spanish people have several meals each day. In the morning, people usually start with a light breakfast (el desayuno) typically with coffee, sweet rolls, toasts or biscuits. Lunch (la comida) is the main hot meal of the day. Between lunch and the evening meal (la cena) people often have a snack late in the afternoon, for example a sandwich. The traditional Spanish diet can be characterized as a typical Mediterranean diet – although there is no clear definition of what this means. The term comes from the 1960s, when several studies by Ancel Keys suggested that Mediterranean countries had lower incidence of coronary heart disease. The Mediterranean diet is characterized by a high intake of vegetables, pulses, fruits and cereals (in the past largely unrefined); a moderate to high intake of fish; a low intake of saturated fats but high intake of unsaturated fats, particularly olive oil; a low to moderate intake of dairy products, mostly cheese and yogurt; a low intake of meat; and a modest intake of ethanol, mostly as wine.

As a result of an application by Spain, Greece, Italy and Morocco, the Mediterranean diet is on UNESCO’s List of Intangible Heritage. This means the governments in these countries are obliged to protect this cultural heritage, but current consumption trends are endangering the Mediterranean diet. Research shows a downward trend in adherence to the Mediterranean Diet over the last decades. Earlier studies found that the Spanish diet was shifting towards more fat and dairy, but that fruit consumption was still the highest in Europe. Figure 6 shows how much people actually eat of different food groups compared with the recommendations. Lower limits are highlighted in green, upper limits in yellow. Due to the large bandwidth in the recommendations we do not show both limits. In several cases the upper limit would lead to unrealistic daily rations. For fish there is no upper limit.

According to this comparison, the intake of all types of meat (red meat, white meat, processed meat) and eggs are above the maximum allowance. The average Spanish adult eats 163g of meat and meat products a day. The high intake of red meat (69g a day) is especially worrying, because it has a high climate impact. Consumption of fish is also high, well above the adequate intake of two servings a week, but due to the lack of an upper limit not too high. Because many fish stocks are unsustainable, an upper level would be appropriate. Intake of dairy seems within the range of what is adequate, but due to variations in serving sizes, this comparison is not very accurate.

Intake of fruit and vegetables is too low, illustrating that dietary habits in Spain are moving towards an average Western diet. Intake of cereal products (bread, pasta, rice, etc.) is within the recommendations, but the lower limit for this product group is actually very low.

In conclusion, the current Spanish diet is quite far from the recommendations of the MDP. This is worrying due to the health implications this might have. High intake of meat and fish will also lead to an increased carbon footprint for Spanish diets and detrimental impacts on global ecosystems.
The traditional French daily routine is characterised by three main meals plus an afternoon snack, particularly for children. The INCA2 study showed this routine has stayed in place mainly for the youngest and oldest participants. However, it is increasingly breaking down among 15- to 35-year-olds.

In France, meals are a time for the family to get together. This social element to meal times is very apparent in both the INCA1 and INCA2 studies. If their family is not present, people tend to share meals with friends or colleagues.

Due to uncertainty about portion sizes and the general nature of the recommendations in the PNNS, a comparison with the actual intake has limitations. The PNNS guidelines do not distinguish between age, gender or energy requirement. Some directions about the interpretation of the PNNS guidelines are given in studies using a PNNS Guideline Score (PNNS-GS). These epidemiological studies assess the relationship between adherence to the PNNS guidelines and health outcomes. To assess adherence, they defined clear categories for the amount of portions in each food group. For instance, the PNNS recommendation on alcohol consumption is a maximum of two glasses a day for women. This can be specified further, because abstainers and subjects consuming less than one glass a week receive the highest PNNS-GS score.

Consumption of meat, eggs and fish in France is right in between the upper and the lower limits of the PNNS guidelines, so more than adequate (see Figure 7). Dairy intake should increase fractionally. Fruit and vegetable intake is too low. People eat fruit and vegetables in almost equal amounts, with men eating a bit more fruit and women more vegetables. On average, intake of alcohol is more than one glass a week, but still below the limit of two to three glasses a day. Men are closer to the limit than women. According to INCA2, people drink less water than recommended, but coffee and tea are not counted as water.

The recommendations on starchy foods are not very specific on amounts. They say people should eat at least one portion during each meal, according to appetite. A daily intake between three and six servings receives the highest PNNS-GS score, implying that this is the average requirement necessary to provide enough energy and nutrients. Due to this large bandwidth in portion sizes, it is difficult to estimate the amount of daily servings, therefore the comparison in Figure 7 is not very accurate with respect to starchy foods.

Two national dietary surveys (INCA1 and INCA2), held eight years apart (1997–98 and 2006–07), show people’s consumption of dairy, meat, bread and potatoes is decreasing. In some cases, like dairy, there was a significant difference between men and women. Encouraging trends include decreased consumption of pastries, croissant-like pastries, cakes, biscuits, sugar and confectionery, and increases in fruit and vegetable intake. A less healthy trend was increased consumption of ice cream and chocolate. Fish consumption remained stable on a sufficient level. However, intake of meat decreased, particularly for women. This might mean women aren’t getting enough iron, but it lowers the climate impact.
3.1 Consumed quantities in dietary surveys (continued)

3.1.3 Sweden

In traditional Swedish cuisine, local produce like dairy products, cereals, cabbage, root vegetables, pork meat, potatoes and a large variety are important. Many dishes are served with lingonberry jam. This type of cuisine is known as Husmanskost (“house owners food”).

Part of tradition is preserved in the Swedish dietary recommendations, with the specific mention of berries and a separate segment for root vegetables. According to a recent scientific study on diets and cardiovascular disease in Sweden, a traditional diet contains more medium-fat milk, offal, boiled coffee, and potatoes and lower amounts of low-fat products and alcoholic drinks. A diet in line with the recommendations contains more low-fat products and alcoholic drinks.

Another example of a healthy alternative to the traditional Nordic diet is the New Nordic Diet (NND), developed by researchers from Denmark. It is tailored to regional conditions, environmentally friendly and based on foods originating from the Nordic region. The NND guidelines suggest eating more calories from plant foods and fewer from meat; more foods from the sea and lakes; and more legumes, cereals, potatoes and a large variety of vegetables and fruits. The recommendations are also made to have dropped since an earlier survey (Hulk 1989). Because cheese is high in saturated fat, further decrease would be positive, although it is a good source of calcium. Consumption of other dairy products is close to the recommendations, with men consuming a fraction more cheese than the guidelines.

Interestingly, the SNO includes liver pate (offal) and blood products – black pudding, for example. The rationale behind this is that these products are high in iron. Without them it would be difficult for women of childbearing age to meet the recommendations.

Another positive trend was that the consumption of cream was below the amount in the SNO reference diet. The rationale behind this is that these products are high in fat. Without them it would be difficult for women of childbearing age to meet the recommendations.

Table 3 shows the differences between the recommendations and the survey in detail and highlights positive and negative trends. Some trends not mentioned above are: intake of margarine spread was lower than in the SNO. Cheese consumption is too high, but seems to have dropped since an earlier survey (Hulk 1989).

The last dietary survey of adults in Sweden was in 1997-98 (Riksmaten 1997-98). A new study began in 2010, but the results have not been published yet, so we have to rely on the old study, although it is outdated. Analysis and discussion of the relevance of the 2010 data to this project may take place after the data is released.

In Figure 8 we compare the results of the 1997-98 survey with the recommended diet according to SNO and the Food Circle. Based on the survey, the Swedish National Food Administration (Livsmedelsverket) concluded that the Swedish population should eat more bread, fruit and vegetables, and less of the foods in the so-called leeway. They also concluded that people should eat better quality fats, which is just as important as reducing total fat intake.

The SNO includes liver pate (offal) and blood products – black pudding, for example. The rationale behind this is that these products are high in iron. Without them it would be difficult for women of childbearing age to meet the recommendations.

Another positive trend was that the consumption of cream was below the amount in the SNO reference diet. Because of the high fat content of cream, this was also judged as a positive outcome.

Men and women eat slightly more meat than is recommended. However, fish intake is well below the quantities recommended in SNO, especially for men.
3.1 Consumed quantities in dietary surveys (continued)

3.1.4 Comparisons between countries and the LiveWell UK plate

Food patterns vary significantly between countries. To make a detailed comparison, we first re-classified all available survey data into a uniform format. We used the classification of food groups used in EPIC-Soft, a computer program used for 24-hours dietary recalls in the European EPIC cohort study. Figure 9 shows each country’s intake of different foods compared with the average of all four countries; Spain, France and Sweden and the UK.

The four countries drink around the same amount of non-alcoholic beverages, as all people have similar requirements for liquids. However, the number of calories coming from this category can vary hugely, depending on what type of drinks people consume.

Spanish people eat the most legumes, fruits, fish, meat, fats and eggs. Their relatively high intake of legumes and fruit is positive and reflects Mediterranean dietary heritage, although it is still below the recommendations.

High intake of fats, eggs and meat is responsible for the fact that the contribution of protein and fat to the overall calorie-intake in Spain exceeded the recommendations. From a nutritional perspective, high consumption of fish and seafood is a positive aspect of the Spanish diet, but it raises questions about sustainability because of depleting fish stocks.

Compared with the other countries, Sweden consumes a lot of dairy, cereal products, sugar/confectionery and potatoes. Surprisingly, intake of vegetables in the UK – as recorded during the National Diet and Nutrition Survey 2008-09 – is higher than in the three pilot countries, although the difference with Spain is small.

The LiveWell UK Plate has more plant foods like potatoes, vegetables, cereal products and especially legumes (pulses) than the other three countries. There are large amounts of legumes in the LiveWell UK Plate to provide an alternative source of protein, with lower climate impact, than meat. The amount of meat in the LiveWell UK Plate is much lower than the current intake in all four countries because of its high climate impact.

Also, the amount of fish in the LiveWell UK Plate is limited compared with current intake in Spain, but above other countries’ current intake. The Plate has enough oily fish and healthy fish fatty acids (EPA and DHA), so it could be argued that Spain’s consumption is too high. As mentioned above, it is certainly well above the minimum allowance. Dairy in the LiveWell UK Plate is relatively high – only Sweden’s intake exceeds it. This is to provide the required amount of calcium in people’s diets.
3.2 Nutrients

3.2.1 Spain

Analysis of the ENIDE study is still ongoing. Mean intake of foods for the whole population, men and women combined\(^2\), and some general conclusions\(^3\) have already been published. Table 4 summarises the information available on Spanish people’s intake of energy and macronutrients, comparing it with the RDIs. We found no Spanish recommendations for energy intake. However, intake in Spain seems high when we consider that the average recommendation for men and women combined in the other two pilot countries varies from 2300 to 2450 kcal.

The proportion of protein and fat in the Spanish diet is higher than recommended, probably due to relatively high amounts of meat and fish. Consequently the intake of carbohydrates is too low.

The fatty acid composition of the average Spanish diet is rather good, except for the amount of saturated fat. High intake of meat and meat products most likely causes this. Spanish recommendations for saturated fat are rather strict compared to Sweden and the Netherlands, where 10% of total energy is the maximum allowance.

Table 4: Intake of energy and nutrients compared with the recommendations. Colours highlight trends: negative (orange) and positive (green).

<table>
<thead>
<tr>
<th>RDI</th>
<th>ENIDE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit</td>
<td>Men</td>
</tr>
<tr>
<td>Energy kcal</td>
<td>2482</td>
</tr>
<tr>
<td>Protein en%</td>
<td>10-12</td>
</tr>
<tr>
<td>Fat en%</td>
<td>&lt;35</td>
</tr>
<tr>
<td>Saturated en%</td>
<td>&lt;7</td>
</tr>
<tr>
<td>Monounsaturated en%</td>
<td>13-18</td>
</tr>
<tr>
<td>Polyunsaturated en%</td>
<td>&lt;10</td>
</tr>
<tr>
<td>n-3 fatty acids g/d</td>
<td>0.2-2</td>
</tr>
<tr>
<td>Carbohydrates en%</td>
<td>50-60</td>
</tr>
<tr>
<td>Alcohol en%</td>
<td>&lt;10</td>
</tr>
<tr>
<td>Alcohol g</td>
<td></td>
</tr>
</tbody>
</table>

Table 4: Intake of energy and nutrients compared with the recommendations. Colours highlight trends: negative (orange) and positive (green).

Spanish people’s high intake of mono-unsaturated fatty acids comes from eating relatively large quantities of olive oil.

If Spanish people ate according to the dietary guidelines, it would certainly have a positive effect on their intake of nutrients and the quality of fat they consume.
3.2 Nutrients (continued)

3.2.2 France

The report accompanying the INCA2 study\(^2\) has lots of detail on French people’s intake of nutrients and energy. We compared the results with the RDIs (see Table 5). Energy intake in France is lower than in Spain. French women eat slightly below the recommendation, but this might be a result of under-reporting, which is always a problem in dietary surveys. As in Spain, French people eat more protein, fat and carbohydrates than the recommendations. High protein intake is related to consumption of meat and fish.

French intake of B vitamins seems adequate, except for folate. This is not particularly worrying, especially because RDIs in other countries are below the actual intake in France. The same is true for vitamin C and vitamin E. French people could increase their intake of vitamin C and folate by eating more citrus fruits.

Intake of vitamin D from food is less than recommended, like in many other countries. In most cases, exposure to sunlight compensates for this. In some countries, like Sweden and the Netherlands, a supplement is recommended for certain groups. It’s also recommended that certain foods are enriched with vitamin D. Oily fish and liver products are natural sources of vitamin D.

Because consumption of dairy is below the recommended amount, French women’s calcium intake is slightly below recommendations. Their intake of iron depends on the bioavailability of iron in diets. When the dietary iron is also less than recommended, although this does not necessarily lead to deficiencies in a significant part of the female population. That depends of the bioavailability of iron in the diet. In this case the French RDI is in line with recommendations elsewhere. Red meat is a good source of bioavailable iron, as it contains heme iron, which is more easily absorbed than iron from plant sources.

Both French men and women consume less copper, zinc, magnesium and selenium than recommended, but intake would be adequate when compared with other guidelines (See Annex II).

In general, intake of nutrients, apart from sodium, would improve if French people followed the PNNS guidelines.

3.2.3 Sweden

We compared intake of nutrients as determined in the 1997-98 survey (Riksmaten) with the Swedish Nutrition Recommendations (Table 6). Intake of energy was lower than expected, but this may be due to under-reporting.

Compared with the recommendations, Swedish women ate slightly too much protein. Men and women’s intake of fat and saturated fat was too high and intake of dietary fibre and carbohydrates too low. Intake of vitamin D through food is adequate for men and close to the recommendations for women. This is due to enrichment of dairy with vitamin D. As Sweden is a northern country, people are not exposed to enough sunlight for the body to synthesise adequate amounts of vitamin D. This vitamin is necessary to ensure good bone health, which is an EFSA approved claim.

Women and men’s intake of vitamin E and folate is below the recommendations. Low intake of folate might be a problem for women who want to get pregnant, as this vitamin prevents the development of neural tube defects\(^3\). In some countries, foods are enriched with folate to prevent deficiencies. In others, it’s recommended that women who want to get pregnant or all women of childbearing age take a 400µg supplement\(^4\). The Swedish authorities decided against mandatory folate fortification of food because of possible adverse health effects. Eating according to SNO would mean women get more folate\(^4\).

Intake of sodium is too high at an average of 7.1g of salt for women and 8.8g for men. High salt intake increases the risk of stroke\(^5\). Potassium, on the other hand, protects against stroke\(^6\). Swedish men and women eat close to the recommendations for potassium. They could increase their intake by eating more fruit and vegetables.

Dietary nitrates can lower blood pressure\(^7\). Limited amounts of sunshine in northern countries may cause elevated levels of nitrate in leafy and root vegetables, offering this protection. On the other hand, high nitrate levels can lead to the formation of carcinogenic nitrosamines if eaten in combination with certain types of fish\(^8\).

Some Swedish women may suffer from iron deficiency, as their mean intake is below the Swedish recommendations. Whether this is actually the case depends on the bioavailability of iron in diets. When the diet contains red meat, the bioavailability is high.

The quality of nutrients and fat in the Swedish diet would certainly improve if people followed the national dietary guidelines\(^3\).
4. Diet-related health issues in pilot countries

4.1 Obesity

Over the last decades obesity (BMI>30) and overweight (25<BMI<30) have become major health threats in European countries. Three times as many people are obese or overweight now compared with the 1980s, according to WHO. Changes in lifestyle, increased availability of calorie-dense foods and social determinants are factors contributing to the imbalance between energy intake and energy consumption. Direct health implications are impaired physical ability and psychological problems. Obesity is also an important risk factor for cardiovascular disease, type II diabetes and certain types of cancer. WHO estimates that the obesity pandemic in Europe takes up 2% to 8% of national health budgets and causes 10% to 13% of all deaths.

The prevalence of obesity and overweight varies strongly between and within countries across Europe. Sweden and France have relatively low rates compared to other Western countries (see Figure 11), 12% and 12.4% respectively. However, more than 40% of France and Sweden’s population have an unhealthy high bodyweight. In Spain, 15.6% of adults are obese and 53.3% are overweight. This is similar to other Mediterranean countries like Portugal and Greece, but higher than France and Italy (see Figure 12).

Across Europe, countries struggle to define policies to counter the pandemic. So far, approaches targeted at individuals have had a low success rate in restoring the energy balance. Many scientific studies have proven that energy-restricted diets may be successful in the short term, but offer no permanent solution for most people. Community-based efforts with health education in schools and promotion of physical activity have proven to be much more effective in reaching all socio-economic groups. An example is the EPODE project that started off in France.

Studies in Spain show that a traditional Mediterranean diet may reduce the incidence of obesity. A French study also found that people with a lifestyle close to the PNNS had a lower obesity risk during a 6 year follow-up period.

The prevalence of overweight people in France (obesity excluded) is higher in men: 38.9% of men are overweight, compared with 24.2% of women. The prevalence of obesity does not differ according to gender and affects 11.6% of adults. Overweight and obesity rates increase with age in men and women alike. Moreover, the prevalence of obesity in adults is inversely associated with the level of education. Lastly, there is a significant obesity gradient between the North and South, with a higher prevalence in the North.

In Sweden, numbers of obese and overweight people have risen since the 1980s, but figures now seem to have plateaued. Community-based efforts in Sweden to decrease prevalence show hopeful results.

4.2 Energy balance

[Graph showing BMI distribution among adults in the UK and pilot countries]
4.2 Cardiovascular diseases

Diet is closely linked to cardiovascular diseases (CVD). Several nutritional factors are directly linked to CVD – and in most cases the scientific evidence is convincing.

Apart from direct links, there is also severe co-morbidity caused by obesity. Dietary factors directly influencing CVD are:

- **Saturated fatty acids**: increased risk of Ischemic Heart Disease when replacing poly-unsaturated fatty acids (PUFA), increased LDL-cholesterol57 when replacing PUFA.
- **Trans fatty acids**: increased risk of Ischemic Heart Disease, increase LDL-cholesterol and lower HDL-cholesterol58.
- **Sodium (salt)**: increased risk of stroke and Ischemic Heart Disease, increased blood pressure.
- **Red meat**: increased risk of CVD mortality59 replacement with fish, nuts, legumes and whole grains decreases the risk.
- **Fruit and vegetables**: weak or non-significant cardio-protective effect60. Lowers blood pressure in interventions trials.
- **Dietary fibre**: decreased risk of CVD61.
- **Fish and fish fatty acids**62: decreased risk of CVD.

The mortality rate due to CVD depends on many factors, such as dietary factors, lifestyle factors, population and health care. Preventive treatment with medicines and advances in cardiovascular surgery have contributed substantially to lowering the CVD death rate. For instance in the Netherlands, CVD is no longer the main cause of death in men. On one hand, we must be careful when comparing CVD death rates between countries. However, we can safely assume that health care in each of the three pilot countries is well-organised.

Figure 13 shows that Sweden has the highest Ischemic Heart Disease mortality rate (heart attacks) of the three pilot countries. Part of the reason for this may be diet, but it is difficult to determine the main causes. Science has not found a clear reason for this trend. Experts have speculated that dietary fats and red wine consumption play a role62. A recent Swedish study shows that a Mediterranean type diet decreased overall mortality and CVD mortality among middle-aged men63, whereas a carbohydrate-restricted diet increased risk. The rate of ischemic Heart Disease in France is the lowest in Europe, despite their relatively high intake of saturated fat. This phenomenon is called the French Paradox63, and is often attributed to a moderate consumption of red wine. But after many years of research, scientists still have not found a definitive explanation.

Figure 14 shows that France has the lowest stroke mortality rate (Figure 14) of the three pilot countries; 26 deaths per 100,000 inhabitants for men and women combined. In Spain it is 36 deaths per 100,000 and in Sweden 40 deaths per 100,000. The difference between France and Spain may be related to the higher prevalence of obesity in Spain; obesity is a major risk factor for high blood pressure65. Dietary factors like fish consumption may explain the difference between France and Sweden, as the prevalence of obesity in both countries is similar. A Mediterranean-style diet could help prevent age-related changes in blood pressure65.

An unhealthy diet and obesity are risk factors for high blood pressure, which increases the rate of strokes. Dietary factors increasing the risk are a high intake of sodium and a low intake of potassium and fish oil. Also related, but to a lesser extent, are low magnesium and calcium intake and excessive coffee and alcohol consumption65. Fruit and vegetables are important sources of potassium. Increasing the intake of this mineral in Western countries to 4.7g/day might decrease the stroke rate by 8% to 15%66.

4.3 Diabetes (type II)

Type II diabetes is caused by being obese and overweight. It is characterised by a decreased sensitivity to insulin, which inhibits muscles’ uptake of glucose. Elevated levels of glucose in the blood are toxic for the body, increasing the risk of stroke, renal failure, limb amputation, impaired eyesight and blindness.

![Figure 15: Prevalence (%) of diabetes in European populations (Source: OECD)](https://example.com/figure15.png)

France has the lowest stroke mortality rate (Figure 14) of the three pilot countries; 26 deaths per 100,000 inhabitants for men and women combined. In Spain it is 36 deaths per 100,000 and in Sweden 40 deaths per 100,000. The difference between France and Spain may be related to the higher prevalence of obesity in Spain; obesity is a major risk factor for high blood pressure65. Dietary factors like fish consumption may explain the difference between France and Sweden, as the prevalence of obesity in both countries is similar. A Mediterranean-style diet could help prevent age-related changes in blood pressure65.

A poor diet is related to the development of type II diabetes due to the link with obesity. Physical exercise and changing diet can reverse insulin resistance65.

A Mediterranean-style diet seems to help protect against type II diabetes, as shown in an intervention trial66 and a prospective cohort study67 in Spain. Interestingly, the prevalence of diabetes in France and Spain is higher than in Sweden (see Figure 15). Based on the prevalence of obesity and overweight in these countries we would expect France to be closer to Sweden. We have not found an explanation for this observation.
### 4.4 Cancers

According to WHO, about 30% of cancer deaths are due to the five leading behavioural and dietary risks: high body mass index, low fruit and vegetable intake, lack of physical activity, tobacco use and alcohol use. The World Cancer Research Fund (WCRF) comprehensively reviewed the relationship between diet and cancer risk. Table 7 summarises the main findings.

<table>
<thead>
<tr>
<th>Foods</th>
<th>Type</th>
<th>Association</th>
<th>Evidence</th>
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<tr>
<td>Red meat and processed meat</td>
<td>colorectal cancers</td>
<td>↑</td>
<td>Convincing</td>
</tr>
<tr>
<td>Alcoholic drinks</td>
<td>breast, colorectal (men), mouth and upper dietary tract</td>
<td>↑</td>
<td>Convincing</td>
</tr>
<tr>
<td>Diets high in calcium</td>
<td>prostate</td>
<td>↑</td>
<td>Probable</td>
</tr>
<tr>
<td>Salt and salty foods</td>
<td>stomach</td>
<td>↑</td>
<td>Probable</td>
</tr>
<tr>
<td>Alcoholic drinks</td>
<td>liver, colorectal (women)</td>
<td>↑</td>
<td>Probable</td>
</tr>
<tr>
<td>Foods rich in dietary fibre</td>
<td>colorectal</td>
<td>↓</td>
<td>Probable</td>
</tr>
<tr>
<td>Fruit, vegetables, legumes (pulses), nuts and seeds</td>
<td>dietary tract and prostate</td>
<td>↓</td>
<td>Probable</td>
</tr>
<tr>
<td>Milk and dairy</td>
<td>colorectal</td>
<td>↓</td>
<td>Probable</td>
</tr>
</tbody>
</table>

Table 7: Associations between dietary factors and cancer (Source: WCRF)

One of the most convincing associations between diet and cancer is a high intake of red meat (beef, pork and lamb, for example). A recent study found that substituting one portion a day of other foods with red meat increased cancer mortality risk by 16% (Hazard Ratio) .

The WCRF recommends people who eat red meat limit their consumption to 500g a week, and sets a public health goal of 300g for a population average. We have not done detailed analysis of red meat consumption in the three pilot countries, but certainly in Spain intake of red meat is above the 500g limit.

The relationship between alcohol intake and cancer is also convincing. People are advised to limit themselves to two drinks a day.

### 4.5 Costs of diet-related health issues

A healthy lifestyle increases life expectancy and the number of years spent in good health. From an economic perspective this saves money on national health care budgets. For example, in the UK, the National Health Service spends an estimated £5.8bn a year in direct costs related to poor diets.

On the other hand, in some cases healthy food may cost more, forcing people with a tight budget to choose unhealthier foods, as studies from France, Sweden and Spain have shown. Stimulating consumption of healthy foods may require financial investment by governments – reduced tax on healthy foods, for example. This will prevent higher health care costs later on. The LiveWell for LIFE project should investigate into the costs of changing to a more sustainable diet.

The costs associated with obesity have been studied extensively. Around Europe, estimates of the total costs associated with overweight and obesity vary from 0.09% to 0.61% of each country’s gross domestic product and from 1% to 5% of national health care budgets.

Obesity in Spain is estimated to be responsible for 7% of the country’s total health costs (€5bn annually). Odegaard et al estimated the total cost of obesity in Sweden at €890bn annually, 1.9% of Sweden’s health care budget, which seems low in comparison with other countries. Hospital care alone was estimated to account for €190bn. In an earlier study from the same researchers, indirect costs associated with early death due to obesity were estimated at €30bn.

In France the annual total cost of obesity was estimated to be €2.1 to €6.2bn in 2002, which was 1.5% to 4.6% of total health expenditure.

Indirect costs associated with obesity include productivity loss caused by absenteeism, disability pensions and premature death. Studies from Sweden, Finland and the Netherlands found a link between obesity and the amount of sick leave and disability pensions.

An older French study estimated direct and indirect costs of obesity at 2% and 10% of the national health care budget. However, the authors stated that they were unable to estimate all costs due to missing information. Recent estimates (Table 8) from the UK show that indirect costs associated with overweight and obesity may be up to seven times higher than direct costs.

#### Table 8: Predictions for direct and indirect costs associated with overweight and obesity in the UK

<table>
<thead>
<tr>
<th>Year</th>
<th>Direct Costs</th>
<th>Indirect Costs</th>
</tr>
</thead>
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<tr>
<td>2007</td>
<td>2.2</td>
<td>2.3</td>
</tr>
<tr>
<td>2015</td>
<td>2.3</td>
<td>2.5</td>
</tr>
</tbody>
</table>

Obese people are at high risk of developing type II diabetes, some at a very young age. People with diabetes need lifelong medical care, approximately two to three times more than other people. According to WHO, diabetes care may take up 15% of national health care budgets. The International Diabetes Federation estimates that health care costs related to type II diabetes account for 11.6% of the world’s total health care expenditure. The average annual cost of caring for a diabetes patient in Europe was estimated at €2,800 – and €5,400 in France. Total costs of diabetes in Sweden are estimated at €800bn annually.

The link between unhealthy diets and certain types of cancer is indirect, making it difficult to estimate the associated additional health costs.

The high costs for health care and society mentioned above show the need to develop community-based preventive measures to promote healthy diets and an active lifestyle. An additional benefit is that these diets tend to be more sustainable. If current dietary trends don’t change, health costs will increase dramatically – and the impact on the world environment will be irreversible.
Conclusion

Current dietary habits in Spain, France and Sweden have progressed from traditional food patterns towards more average Western diets, with too little wholegrain cereals, legumes, fruit and vegetables. Intake of red meat and high-calorie processed foods has increased. These trends have negative consequences for public health and the climate impact of national diets.

Direct costs to treat the diseases caused by poor diets put a huge strain on national health care budgets. Indirect costs to society – for example, due to increased absence from work, or disability – are estimated to be even higher.

As part of government campaigns to promote healthier diets in Spain, France and Sweden there are food-based dietary guidelines (FBDGs) aimed at the general public. They consist of a basic set of rules, often accompanied by a graphic representation of a healthy diet – for example, in the form of a food diet pyramid, plate or wheel. The Spanish pyramid is the only set of FBDGs that draws attention to sustainability, but it doesn’t mention how people can eat more sustainably. Specific recommendations for eating sustainably are under development.

The aim of LiveWell for low impact food in Europe (LIFE) is to modify national FBDGs in Spain, France and Sweden so they have a lower climate impact, similar to WWF’s LiveWell Plate for the UK. As the guidelines in Spain and France are very general and don’t specify recommended quantities, they do not offer a clear starting point. Diets with a very high or very low climate impact are still possible within the scope of the recommendations. Therefore LiveWell Plates for Spain and France could consist of a basic set of rules for less climate-intensive options within the boundaries of the current guidelines. The guidelines for Sweden, represented as a Food Circle (Matcirkeln), are accompanied by a reference diet for men and women, which is very specific on quantities of foods. Therefore, these offer a clear starting point for the development of a less climate-intensive LiveWell Plate for Sweden.

The next stage of the LiveWell for LIFE project will use the findings from this piece of work as a foundation to build specific LiveWell diets in Spain, France and Sweden, which we aim to publish in autumn 2012.

References


41. Marmot, M. 2010. Interim first report on social determinants of health and the health divide in the WHO European Region Interim first report on social determinants of health and the health divide in the WHO European Region. WHO.


References (continued)


88. Quesada RMOFPJLBSEM. PREJUICIOS Y VIRTUDES SOBRE LAS GRASAS Y OTROS ALIMENTOS.


## Annex I

<table>
<thead>
<tr>
<th>Food groups, subgroups</th>
<th>Gretel, 9.1 MJ</th>
<th>Hansel, 11.5 MJ</th>
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<tr>
<td></td>
<td>g/day</td>
<td>g/week</td>
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<tr>
<td>Fruit and vegetables, total</td>
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<td>3850</td>
</tr>
<tr>
<td>Vegetables</td>
<td>250</td>
<td>1750</td>
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<tr>
<td>Lettuce, tomato, pepper, onion etc.</td>
<td>125</td>
<td>875</td>
</tr>
<tr>
<td>Carrot, broccoli, white cabbage etc.</td>
<td>125</td>
<td>875</td>
</tr>
<tr>
<td>Fruits and berries</td>
<td>214</td>
<td>1498</td>
</tr>
<tr>
<td>Fruit juice</td>
<td>86</td>
<td>602</td>
</tr>
<tr>
<td>Pulses, dried</td>
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<td>70</td>
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<tr>
<td>Bread, total</td>
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<tr>
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<td>525</td>
</tr>
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<td>203</td>
</tr>
<tr>
<td>Flour</td>
<td>7</td>
<td>49</td>
</tr>
<tr>
<td>Potatoes</td>
<td>115</td>
<td>805</td>
</tr>
<tr>
<td>Rice, couscous</td>
<td>18</td>
<td>126</td>
</tr>
<tr>
<td>Pasta</td>
<td>36</td>
<td>252</td>
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<tr>
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<td>95</td>
<td>665</td>
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<td>Lean types</td>
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<td>Fatty types</td>
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<tr>
<td>Sausage</td>
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<td>98</td>
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<td>105</td>
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<td>Blood-based foods</td>
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<td>Eggs</td>
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</tr>
<tr>
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<td>836</td>
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<tr>
<td>Fat 3%</td>
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<tr>
<td>Cheese</td>
<td>20</td>
<td>140</td>
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<tr>
<td>Fat ≤ 17%</td>
<td>14</td>
<td>98</td>
</tr>
<tr>
<td>Cottage cheese, whey cheese</td>
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<td>35</td>
</tr>
<tr>
<td>Cream</td>
<td>14</td>
<td>91</td>
</tr>
<tr>
<td>Total fat [margarine, oil]</td>
<td>38</td>
<td>266</td>
</tr>
<tr>
<td>Margarine spread on bread</td>
<td>19</td>
<td>133</td>
</tr>
</tbody>
</table>

Swedish food list. Amounts of foods (raw) for women (Gretel) and men (Hans) with low physical activity. 

## Annex II Nutrient recommendations

### Spain

The Spanish Society for Dietetics and Food Science (SEDCA) publishes recommended nutrient intakes for Spain. Those for fat and fatty acids are summarised elsewhere, see Annex II for a comprehensive overview. No Spanish recommendations were found on energy requirements, dietary fibre and certain common vitamins and minerals. Where restrictions are desired during the modelling of diets other recommendations, like those of WHO, can be used. Both WHO and the Scientific Committee on Food have published guidelines for energy requirements.

### France

An overview of the most current RDIs for nutrients in France is published on the website of the French Agency for Food, Environment and Occupational Health Safety (ANSES) – see Annex II for an overview. We found no French recommendations on the different groups of fatty acids, alcohol and dietary fibre. If restrictions on these nutrients are required during the linear programming, the WHO recommendations could be applied. For alcohol, the amount of alcohol in two or three glasses can be used.

### Sweden

The Swedish Nutrition Recommendations are based on the Nordic Nutrition Recommendations. The recommendations for fat, carbohydrates, protein, vitamins and minerals are identical (See Annex II). The SNR also includes recommendations on a balanced diet and eating pattern. Recommendations for certain vitamins and minerals are not included. If required, the WHO recommendations can be used as restrictions.
# Annex II Nutrient recommendations (continued)

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Unit</th>
<th>France Men</th>
<th>France Women</th>
<th>Spain Men</th>
<th>Spain Women</th>
<th>Sweden Men</th>
<th>Sweden Women</th>
<th>WHO Men</th>
<th>WHO Women</th>
<th>EU Men</th>
<th>EU Women</th>
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<td>Energy</td>
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<td>2000-2200</td>
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<td>Fat</td>
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<td>&lt; 35</td>
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<td>20 - 35</td>
<td>30 - 35</td>
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<td>Polyunsaturated</td>
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<td>&lt; 10</td>
<td>5 - 10</td>
<td>0 - 11</td>
<td>6 - 11</td>
<td>9 - 11</td>
<td>6 - 11</td>
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<td></td>
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<tr>
<td>n-3 fatty acids</td>
<td></td>
<td>-</td>
<td>0.2 - 2 g/d</td>
<td>2.0 - 2 g/d</td>
<td>1 en%</td>
<td>0.5 - 2 en%</td>
<td>0.5 - 2 en%</td>
<td>0.5 - 2 en%</td>
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<td>Alchohol</td>
<td>g</td>
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<td>&lt; 30</td>
<td>&lt; 30</td>
<td>&lt; 30</td>
<td>0.3 - 1.2</td>
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<td>&lt; 10</td>
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For more information about **LiveWell for LIFE** and how to be involved, please visit: [www.livewellforlife.eu](http://www.livewellforlife.eu)