

NUMBER 3



Energy intake, profile and dietary sources in the Spanish population: findings of the ANIBES study

















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In Europe, lifestyle practices, including dietary habits, have changed significantly over the past 50 years, becoming less distinct and moving towards an increasingly more homogeneous "Western diet".

Spain has undergone dramatic social and socioeconomic changes since the 1960s, such as massive rural–urban migration, rapid urbanization processes during the 1980s and generalized incorporation of females into the active workforce.

As a result of all these transitions, the Spanish population has gradually turned away from its traditional Mediterranean diet, including changes both in eating habits as well as in physical activity and lifestyle, which could have potentially negative consequences for both present and future populations.

Overweight and obesity affect more than half of the adult population and nearly 30 % of children and adolescents. Even though it has been suggested that excessive energy intake could be the primary cause of this problem, it is also true that a sedentary lifestyle, with a low physical activity level, could play an important role both in the etiology of obesity and in the diet.

Although it is true that many very valuable dietary surveys have been conducted in Spain, none of them have focused jointly on energy intake and its determinants using, moreover, new and more accurate technologies.

In this respect, the ANIBES ("Anthropometry, Intake, and Energy Balance in Spain") scientific study is specifically designed to analyze the energy balance and its determinants in Spain. Its main objective is to determine the energy intake in a representative sample of the Spanish population according to age and sex, as well as to identify those foods and beverages that contribute to this intake.

That energy intake has decreased in recent years in the Spanish population, compared with records obtained from certain food and dietary survey data since 1964. Moreover, food and beverage groups that contribute to the current intake are highly diverse. In any event, efforts must be increased to ensure better adherence to the traditional Mediterranean diet.

The study, in data

- **Age groups:** from 9 to 12 (children), 13 to 17 (adolescents), 18 to 64 (adults) and 65 to 75 (elderly)
- **Gender:** male and female
- **Geographical distribution:** (north-east, east, south, west, north-central, Balearic and Canary Islands, and metropolitan areas of Madrid and Barcelona)
- Population size:
 - · 2,000 to 30,000 inhabitants ("rural" population)
 - · 30,000 to 200,000 inhabitants ("semi–urban" population)
 - · More than 200,000 inhabitants ("city" / "town" population)

The study was performed by using stratified sampling and was carried out in several stages, with 128 sample points, 90 interviewers divided into 11 different areas and 12 coordinators, who had been previously trained by the Spanish Nutrition Foundation technicians.

Other factors considered in the sample selection:

- Unemployment rate
- Percentage of foreigners (immigrant population)
- Physical activity level
- Educational level / socio-economic level





Evolution of the energy intake

According to the data gathered in the ANIBES scientific study, whose field work was carried out over a three-month period, from September to November 2013, mean daily energy intake per day and per person in Spain is 1,810 \pm 504 kcal/day (1,957 \pm 531 kcal/day for men and 1,660 \pm 427 for women).

With respect to children aged between 9 and 12, mean daily energy intake stands at 1,960 \pm 431 kcal/day. Whereas younger males' intake increases up to 2,006 \pm 456 kcal/day, girls have a mean intake of 1,893 \pm 385 kcal/day. On the other hand, adolescents aged between 13 and 17 consume, on average, 2,018 \pm 508 kcal/day, with intake in men (2,124 \pm 515 kcal/day) being slightly higher than in women (1,823 \pm 436 kcal/day).

With respect to the adults group aged between 18 and 64, their mean daily energy intake per person is 1,816 \pm 512 kcal, standing at 1,966 \pm 543 kcal/day for the male population and 1,675 \pm 437 kcal/day for the female population.

The group of elderly people, aged between 65 and 75, is the one that has the lowest average calorie intake, with almost 200 kcal/day below the general average, standing at $1,618 \pm 448$ kcal/day. Even though there are no significant differences between men and women in this group, it is noteworthy to mention that the female population over 65 consumes only $1,476 \pm 360$ kcal/day, while in the case of the male population is $1,771 \pm 485$ kcal.

Different surveys conducted in our country have confirmed an energy intake reduction trend, in keeping with a similar pattern in most European countries. To be specific, the Spanish adult population's average energy con-sumption in 2010 stood at 2,609 kcal/person/day, clearly lower than in 1964 (3,008 kcal/ person/day) and, in both cases, much higher than the current average recorded in the ANIBES scientific study $(1,810 \pm 504 \text{ kcal/person/day})$.

However, according to the last case, the information comes from the Food Consumption Panel, which potentially involves an overrating due to the applied methodology.

When comparing the results of the ANIBES scientific study with the EFSA's latest reference energy intake values in 2013, the population's mean energy intake in Spain was only adequate in the group of boys and girls aged between 9 and 12. Intake in male adolescents (which reach only 80.0 % of the recommended average), in male adults (78.0 % of the recommended average) and in elderly men (77.9 % of the recommended average) was below recommendations (considering a moderate physical activity level). With respect to adolescent women, 82.6 % reached the recommended mean intake established by the EFSA, 82.0 % in the case of adult women and 80.5 % in the case of elderly women.

If current recommended energy intake levels in Spain (2013) are taken as a reference, this insufficient energy intake is even more noteworthy, where children only cover 81.9 % of the recommendation (82.3 % in the case of girls). Special emphasis must be placed on male adolescents (75.9 % of recommended energy intake) and female adolescents (76.0 %), as well as on male adults (69.0 % of recommended energy intake), on female adults (79.5 %), on elderly men (73.8 %) and on elderly women (78.7 % of recommended energy intake).

However, generic recommendations should be determined and evaluated individually, as there may be cases in which it is necessary to reduce the energy intake because it exceeds the recommended amount of energy intake. For this reason, the analyses with average data are decisive to assess the general situation, but they should be done individually in order to apply reference criteria.

Nevertheless, it must be taken into account that daily intakes used as a reference may lack the necessary revisions in terms of stratification of the population's current physical activity levels.





Food and drink groups and subgroups

Sixteen food groups have been taken into account: cereals and grains, meat products, milk and dairy products, oils and fats, ready-to-eat meals, fruits, non-alcoholic beverages, vegetables, fish and shellfish, sugars and sweets, alcoholic beverages, pulses, eggs, sauces and condiments, appetizers and supplements and meal replacements.

As a result of the great diversity of existing food products, some of these groups have been divided into subgroups. This allows to measure the importance of the subgroups individually and their different composition within the same group. In total, the study has considered 29 subgroups:

- Cereals and grains: bread, bakery and pastry, grains and flours, pasta, breakfast cereals and cereal bars.
- Meat and meat products: meat, sausages and other meat products, viscera and offal.
- Milk and dairy products: Milk, cheese, yogurt and fermented milks and other dairy products.
- · Oils and fats: olive oil, other oils, butter, margarine and shortening.
- · Ready-to-eat meals
- Fruits
- Non-alcoholic beverages: juices and nectars, sugared soft drinks, coffee and herbal teas, sports drinks, energy drinks, unsweetened soft drinks, water, other drinks (nonalcoholic).
- Vegetables
- · Fish and shellfish
- Sugars and sweets: chocolate, sugar, jams and other, other sweets.
- · Alcoholic beverages: low alcohol content beverages, high alcohol content beverages.
- Pulses
- Eggs
- Sauces and condiments
- Appetizers
- Supplements and meal replacements

Cereals and grains [(27.4 %) (bread 11.6 %; bakery and pastry 6.8 %; grains and flours 4.5 %; pasta 3.6 % and breakfast cereals and cereal bars 1.0 %)], meat and meat products [(15.2 %) (meat 9.2 %; sausages and other meat products 5.8 % and viscera and offal 0.1 %)] and oils and fats [(12.3 %) (9.2 % olive oil; other oils 1.7 % and butter, margarine and shortenings 1.4 %)] are the food groups that most contribute to the daily intake. Then, milk and dairy products are placed [(11.8 %) (milk 5.0 %; cheese 3.0 %; yogurt and fermented milk 2.4 % and other dairy products 1.5 %)], as well as fruits (4.7 %), ready-toeat meals (4.2 %), vegetables (4.0 %) and other non-alcoholic beverages [(3.9 %) (sugared soft drinks 2.0 %; juices and nectars 1.3 %; other non-alcoholic drinks 0.3 %; coffee and herbal teas 0.2 %; sports drinks 0.1 %; energy drinks 0 %; unsweetened soft drinks 0 % and water 0 %)]. Finally, fish and sellfish (3.6 %), sugars and sweets [(3.3 %) (chocolate 1.5 %; sugar 1.4 %; jams and other 0.3 % and other sweets 0.1 %)], alcoholic beverages [(2.6 %) (low alcohol content beverages 2.4 % and high alcohol content beverages 0,2 %)], pulses (2.2 %), eggs (2.2 %), sauces and condiments (1.6 %), appetizers (0.8 %) and supplements and meal replacements (0.1 %) are the groups of foods that are placed at the end of the list in the contribution to the total calories from the daily diet. The tables have been included in decreasing order, according to the percentage of energy intake, all groups and subgroups of food by cohort and by sex.

Unbalanced caloric profile

The ANIBES scientific study shows that the population in Spain currently has an unbalanced energy intake profile, being 16.8 % the percentage of monounsaturated fatty acids, 11.7 % of saturated fatty acids, 6.6 % of polyunsaturated fatty acids, corresponding 5.4 % to omega-6 fatty acids and 0.6 % to omega-3 fatty acids. The intake of proteins represents 16.8 % (above the recommended amount), that of fiber is 1.4% and alcohol is 1.9 % of the total daily energy intake of the population in the ANIBES study.





Nutrient recommendations

Proteins

The intake of proteins in the Spanish population, according to the ANIBES study, stands at 16.8 % (16.7 % in men and 17.0 % in women), a percentage that is clearly higher than the limit recommended by the EFSA, which is 15.0 %. All the age groups represented in the study showed a high protein contribution to daily energy intake, a source that increases with age (from 15.1 % in girls up to 17.3 % in women over the age of 65).

Lipids

Fat intake for the total population in the ANIBES study stood at 38.5 %, being significantly higher in the female population (38.7 %) compared with the male population (38.2 %). Neverthe- less, there is no great difference when looking at dietary fat contribution according to age groups (ranging from 37.2 % in men of over 65 years of age to 38.9 % for all young people).

Fats and oils are also important sources of essential fatty acids. The EFSA explains that fat intake should represent between 20.0 % and 35.0 % of the total energy consumed determined by its quality, a similar range to the one also recently proposed by the World Health Organization (WHO) and the FAO.

The intake of saturated fatty acids (SFA) is far above recommendations in all age groups and in both sexes (with a mean of 11.7 %). In this respect, although the EFSA has not set any limits recently, the WHO recommends that no more than 10,0 % of energy intake should come from this source.

One positive aspect of the Spanish population's dietary patterns is the high proportion of monounsaturated fatty acids (MUFAs), due to the regular use of olive oil, given the existing scientific evidence on its cardioprotective effects. In the ANIBES study, MUFAs contribute 16.8 % to the total energy intake from fats, being also a major contribution from olive oil.

Carbohydrates

In nutrition terms, there are two large carbohydrate categories: "glycemic carbohydrates" (carbohydrates digested and absorbed in the human small intestine) and "dietetic fiber" (non-digestible carbohydrates that pass through to the large intestine without being digested). Main glycemic carbohydrates are monosaccharides, disaccharides, maltooligosaccharides and starch.

The EFSA proposes a reference range from 45.0 % to 60.0 % of the total energy intake for carbohydrates, in which the sum of monosaccharides and disaccharides accounts for less than 10.0 % of the total energy intake. The ANIBES study evidences a low energy carbohydrates intake (41.1 %), with the lowest contribution being observed in elderly men (39.6 %) and with the highest intake being observed in adolescent women (45.2 %).

With respect to sugar consumption, according to the results of the ANIBES study, these ac- count for 17.0 % of the total daily energy intake. In this sense, the EFSA reference intake, which can be identified on food product labels, is 18.0 %, 90 g per day for an average of 2,000 kcal/day intake. Therefore, it would be placed in amounts similar to those recommended by the EFSA on average for the European population.





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- 2. General | Men (9-75 years old)
- **3. General | Women** (9-75 years old)
- **4. Boys and girls** (9-12 years old)
- **5. Boys** (9-12 years old)
- **6. Girls** (9-12 years old)
- **7.** Adolescents (13-17 years old)
- **8. Adolescents | Boys** (13-17 years old)
- 9. Adolescents | Girls (13-17 years old)
- **10. Adults** (18-64 years old)
- **11. Adults | Men** (18-64 years old)
- **12. Adults | Women** (18-64 years old)
- **13. Elderly** (65-75 years old)
- **14. Elderly | Men** (65-75 years old)
- **15. Elderly | Women** (65-75 years old)



11.6

9.2

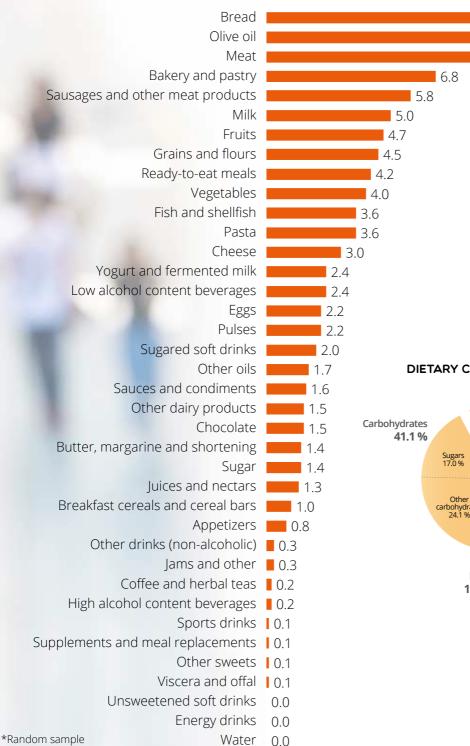
9.2

Dietary sources of energy from food and beverage groups and subgroups

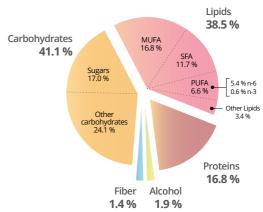
1. GENERAL 9-75 YEARS OLD

(% kcal/day/person) Sample: 2,009 individuals*

Mean daily energy intake: 1,810 ± 504** kcal/day



DIETARY CALORIC PROFILE



Saturated Fatty Acids

MUFA: Monounsaturated Fatty Acids

Polyunsaturated Fatty Acids

n-6: n-6 Fatty Acids n-3: n-3 Fatty Acids



^{**} Mean ± standard deviation





12.2

9.7

8.7

6.5

6.3

4.6 4.6

4.4

4.2

3.8 3.7

3.2

3.1

2.9

2.3

Dietary sources of energy from food and beverage groups and subgroups

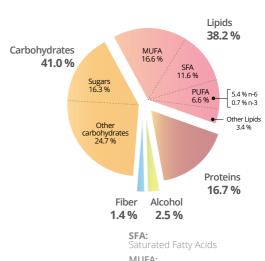
2. GENERAL MEN 9-75 YEARS OLD

(% kcal/day/person) Sample: 1,113 individuals*

Mean daily energy intake: 1,957 ± 531** kcal/day



DIETARY CALORIC PROFILE



MUFA: Monounsaturated Fatty Acids

Polyunsaturated Fatty Acids

n-6: n-6 Fatty Acids n-3: n-3 Fatty Acids

Water 0.0

^{*}Random sample

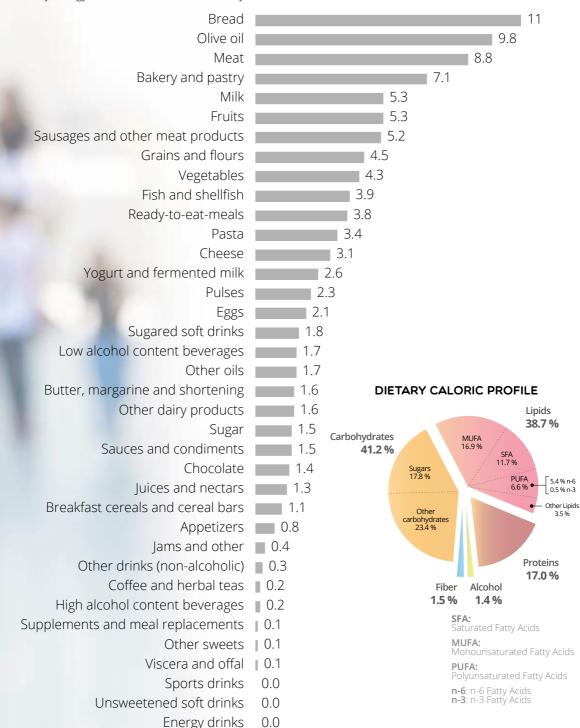
^{**} Mean ± standard deviation



3. GENERAL WOMEN 9-75 YEARS OLD

(% kcal/day/person) Sample: 996 individuals*

Mean daily energy intake: 1,660 ± 427 ** kcal/day



Water

0.0



^{*}Random sample ** Mean ± standard deviation

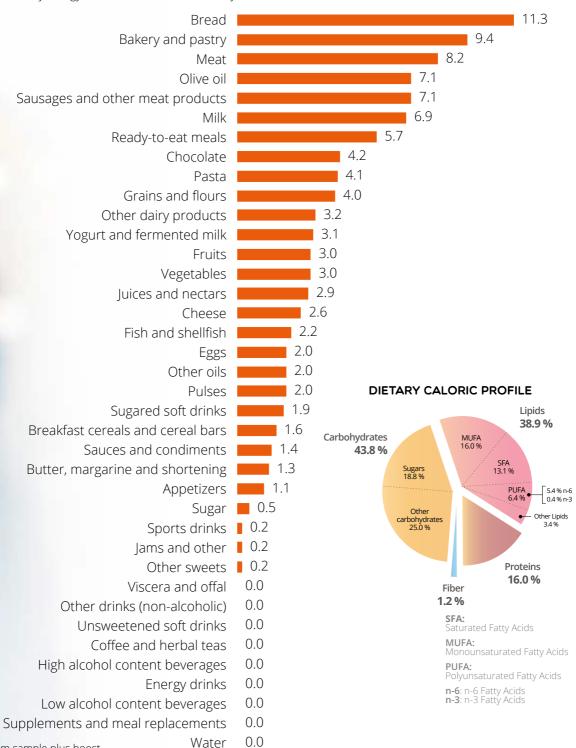




4. CHILDREN BOYS AND GIRLS 9-12 YEARS OLD

(% kcal/day/person) Sample: 213 individuals*

Mean daily energy intake: 1,960 ± 431** kcal/day



^{**} Mean ± standard deviation

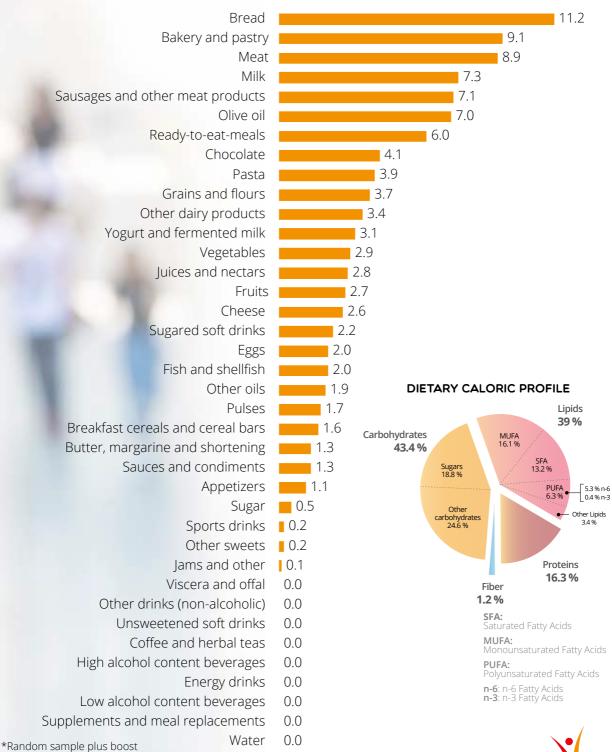
*Random sample plus boost



5. CHILDREN BOYS 9-12 YEARS OLD

(% kcal/day/person) Sample: 126 individuals*

Mean daily energy intake: 2,006 ± 456** kcal/day



^{**} Mean ± standard deviation

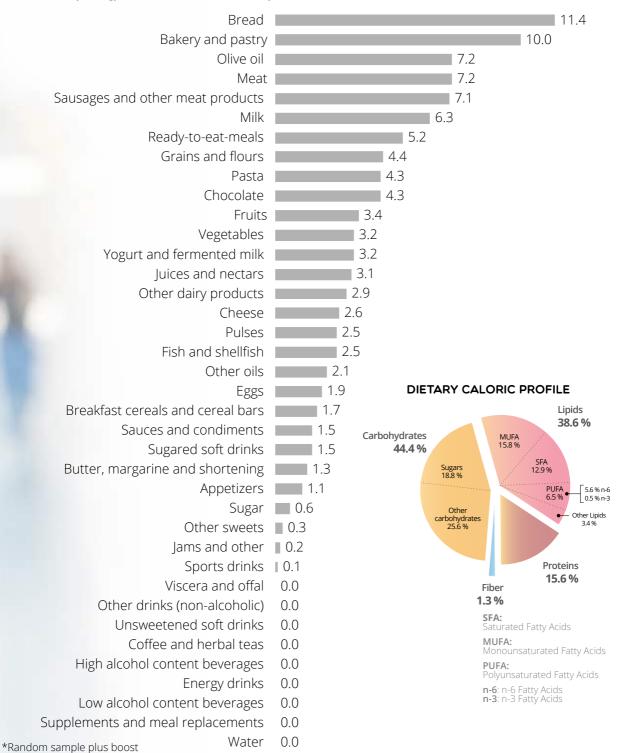




6. CHILDREN GIRLS 9-12 YEARS OLD

(% kcal/day/person) Sample: 87 individuals*

Mean daily energy intake: 1,893 ± 385** kcal/day



ANIBES scientific study >> Anthropometric data, macronutrients and micronutrients intake, practice of physical activity, socioeconomic data and lifestyles of the population

** Mean ± standard deviation



11.5

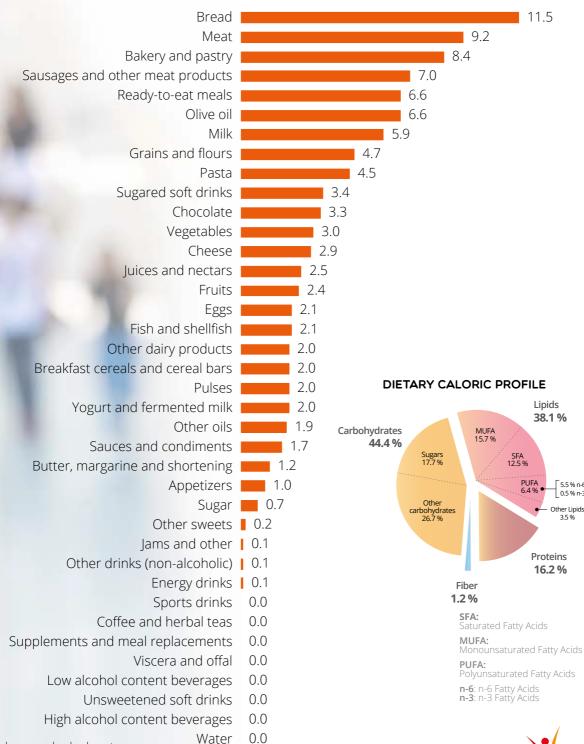
Dietary sources of energy from food and beverage groups and subgroups

7. ADOLESCENTS 13-17 YEARS OLD

(% kcal/day/person) Sample: 221 individuals*

*Random sample plus boost ** Mean ± standard deviation

Mean daily energy intake: 2,018 ± 508** kcal/day



Lipids

SFA 12.5 %

38.1 %

5.5 % n-6 0.5 % n-3

Other Lipids 3.5 %

Proteins

16.2 %

¹⁷

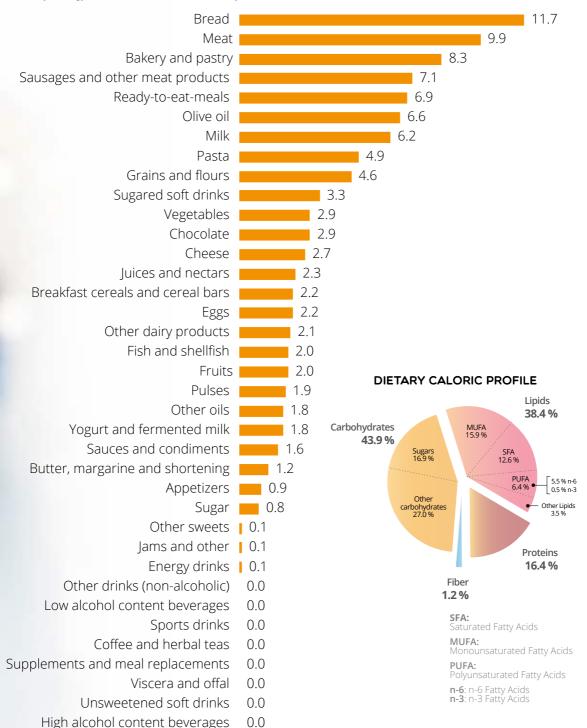




8. ADOLESCENT BOYS 13-17 YEARS

(% kcal/day/person) Sample: 137 individuals*

Mean daily energy intake: 2,124 ± 515** kcal/day



^{*}Random sample plus boost ** Mean ± standard deviation

0.0

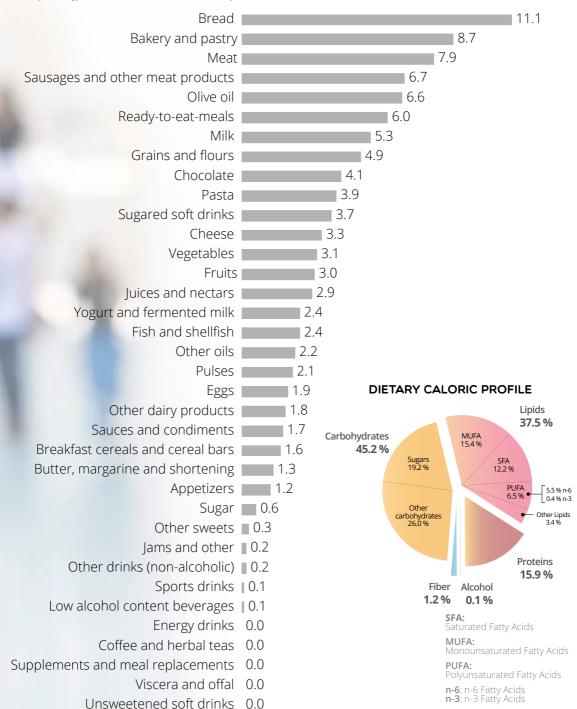
Water



9. ADOLESCENT GIRLS 13-17 YEARS

(% kcal/day/person) Sample: 74 individuals*

Mean daily energy intake: 1,823 ± 436** kcal/day





High alcohol content beverages 0.0

Water 0.0

^{*}Random sample plus boost ** Mean ± standard deviation

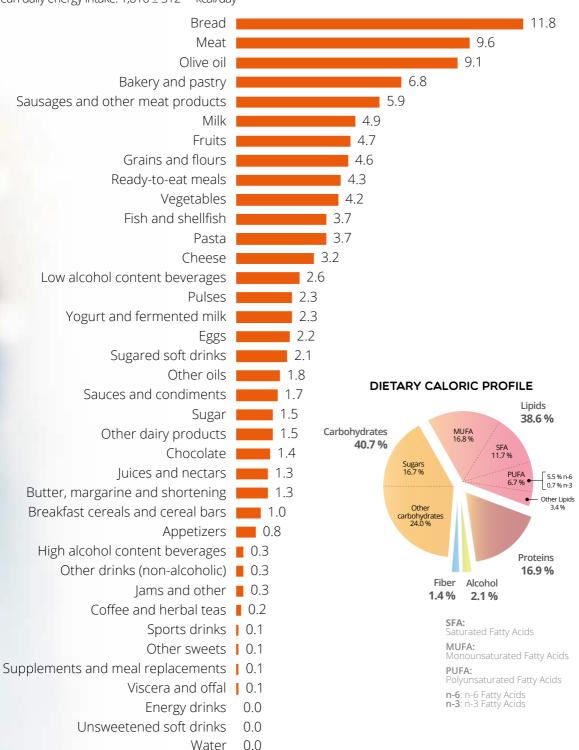




10. ADULTS 18-64 YEARS OLD

(% kcal/day/person) Sample: 1,655 individuals*

Mean daily energy intake: 1,816 ± 512** kcal/day



^{*}Random sample plus boost

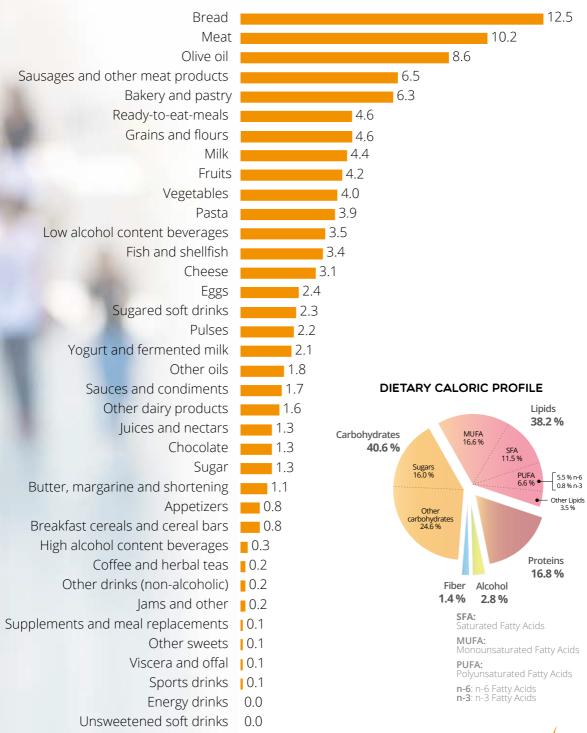
^{**} Mean ± standard deviation



11. ADULT MEN 18-64 YEARS OLD

(% kcal/day/person) Sample: 798 individuals*

Mean daily energy intake: 1,966 ± 543** kcal/day



Water

0.0

^{*}Random sample plus boost

** Mean ± standard deviation

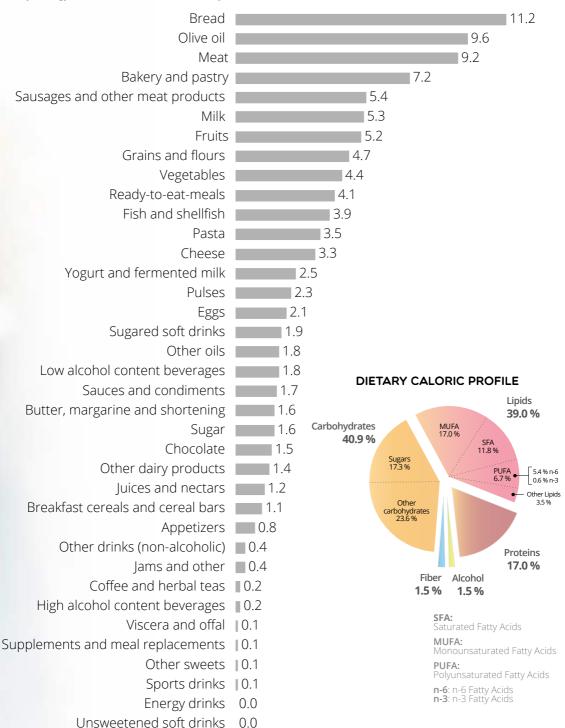




12. ADULT WOMEN 18-64 YEARS OLD

(% kcal/day/person) Sample: 857 individuals*

Mean daily energy intake: 1,675 ± 437** kcal/day



^{*}Random sample plus boost

Water 0.0

^{**} Mean ± standard deviation



12.5

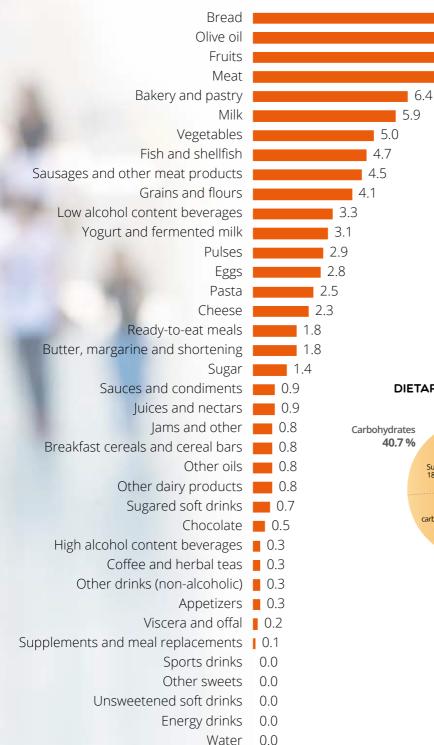
12.2

Dietary sources of energy from food and beverage groups and subgroups

13. ELDERLY 65-75 YEARS OLD

(% kcal/day/person) Sample: 206 individuals*

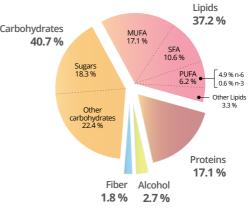
Mean daily energy intake: 1,618 ± 448** kcal/day



DIETARY CALORIC PROFILE

8.7

8.5



Saturated Fatty Acids

MUFA: Monounsaturated Fatty Acids

Polyunsaturated Fatty Acids

n-6: n-6 Fatty Acids n-3: n-3 Fatty Acids



^{**} Mean ± standard deviation



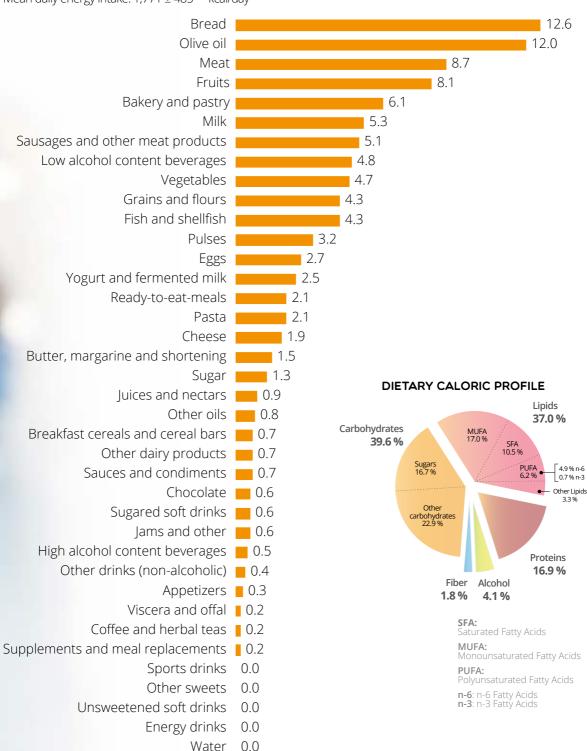




14. ELDERLY MEN 65-75 YEARS OLD

(% kcal/day/person) Sample: 99 individuals*

Mean daily energy intake: 1,771 ± 485** kcal/day



^{*}Random sample plus boost

^{**} Mean ± standard deviation



12.5

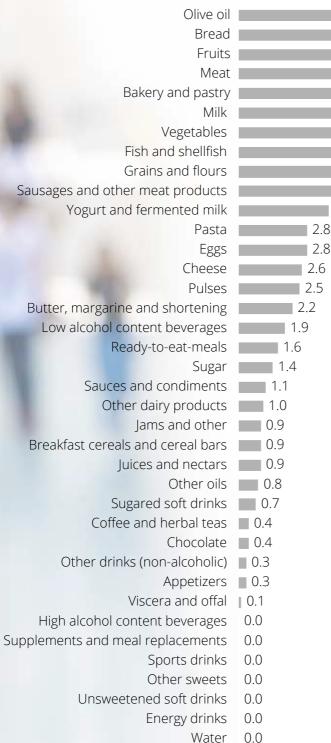
12.3

Dietary sources of energy from food and beverage groups and subgroups

15. ELDERLY WOMEN 65-75 YEARS OLD

(% kcal/day/person) Sample: 107 individuals*

Mean daily energy intake: 1,476 ± 360** kcal/day



DIETARY CALORIC PROFILE

9.4

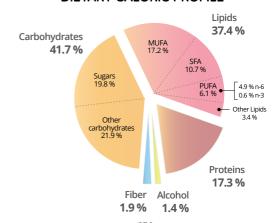
6.8

6.4

5.2

5.0

3.7



Saturated Fatty Acids

MUFA: Monounsaturated Fatty Acids

Polyunsaturated Fatty Acids

n-6: n-6 Fatty Acids n-3: n-3 Fatty Acids



^{*}Random sample plus boost

^{**} Mean ± standard deviation



References

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The final protocol of the ANIBES scientific study was previously approved by the Clinical Research Ethics Committee of the Community of Madrid (Spain).



