



ANIBES

**Lifestyle Patterns and
Weight Status in Spanish Adults:
The ANIBES Study**

With the participation of:



NUMBER 20

Lifestyle Patterns and Weight Status in Spanish Adults: The ANIBES Study

Introduction

Overweight and obesity rates have progressively increased during the last decades and have become a major issue in public health, both in developed countries and developing economies.

In Spain, recent data report that more than half of adults aged 18–64 years are classified as overweight or obese. This is particularly worrying for the negative impact of this condition on health and quality of life.

The role of diet in obesity is complex and most research in this area has focused only on the study of specific foods and nutrients. Nevertheless, the analysis of food patterns is particularly interesting, since foods are usually consumed in combinations and those may have synergistic, antagonistic, or moderating effects.

It is acknowledged that joint interactions of multiple variables acting at different levels influence weight gain, such as lifestyles sleep, including rhythm, duration or quality of sleep, eating behaviors, socioeconomic level, education, and other factors.

Data-driven methods explore the similarities between different food options in specific population groups. Specifically, cluster analyses include several techniques aimed at grouping together individuals sharing a number of similar patterns, in both food and lifestyles.

Research of dietary patterns and the potential combination of those with other lifestyles can contribute to identifying effective strategies for the prevention of overweight and obesity among adults, as well as the improvement of its negative social and health consequences.

Considering the above, the objectives of this paper are:

- To identify food patterns in the Spanish adult population.
- To investigate if energy balance-related behaviors tend to assemble into meaningful patterns in Spanish adults.
- To describe existing relationships between socio-demographical factors and different lifestyle patterns.
- To analyze the potential association of those correlates with excess body weight



Materials and Methods

The design, protocol and methodology of the ANIBES Study have been already described in detail in Ruiz E. et al. 2015 and Varela-Moreiras G. et al. 2015.

Likewise, details of the methodology for dietary intake data collection are specified in Ruiz E. et al. 2015. In this sense, the methodology for the collection of anthropometric parameters is described in López-Sobaler AM. et al. 2016.

The description of physical activity patterns was made in Mielgo-Ayuso J. et al. 2016. On the other hand, the analysis of different lifestyle factors was stated in López-Sobaler AM. et al. 2016.

As for this research, the sample comprised 1,611 individuals aged between 18 and 64 years (778 men and 833 women).

Exploratory factor analysis was performed to identify underlying dietary patterns, using the average food weight (g/day) consumed by each individual (three-day food record plus one-day 24-h recall) from 38 food groups as input variables. Z-scores for each food group were calculated to prevent the components being dominated by the foods that provide the highest amounts. The strength and direction of the associations between patterns and food groups were described through a rotated factor loading matrix.

Dietary Patterns

After this data analysis, four major factors were extracted:

- **“Traditional” Dietary Pattern:** characterized by a higher intake of olive oil, vegetables, fish, meat and fruits, and a lower intake of pasta and pre-cooked deep fried foods.
- **“Mediterranean” Dietary Pattern:** characterized by a higher intake of water, fruits, yoghurt, fish, vegetables, cheese and olive oil, and a low intake of meat and sugar sweetened beverages.
- **“Snack” Dietary Pattern:** characterized by a prevailing intake of bread, processed and cold meats, alcoholic beverages, salted snacks, cheese, and juices.
- **“Dairy-sweet” Dietary Pattern:** characterized by a food intake in which milk, sugars and sweets, cakes, pastry and juices stand out, and a lower intake of alcoholic beverages.

The factor score for each pattern was constructed by summing the observed intakes of the component food items weighted by the factor loading. A high factor score for a given pattern indicated high intake of the foods constituting that food factor, and a low score indicated low intake of those foods.

In order to create lifestyle patterns, a combination of hierarchical and non-hierarchical clustering analysis was used based on the association of dietary patterns and physical activities, sedentary activities, sleeping habits and smoking habits.



Weight status of the sample

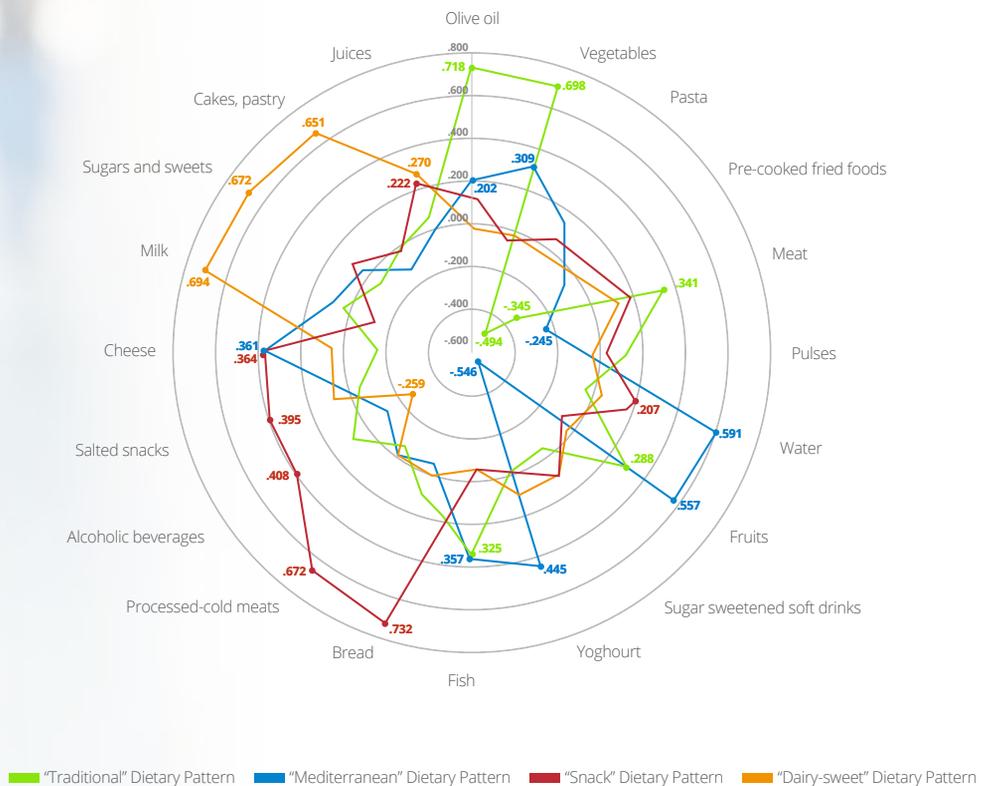
38 % of the sample was overweight with a Body Mass Index (BMI) between 25 and 29.9. On the other hand, 21.6 % was obese (BMI \geq 30). There was no significant difference between men and women in age distribution, level of education, or geographical area. However, overweight and obesity rates were significantly higher in men than women.

Main differences between dietary patterns

“Traditional” and “Mediterranean” Dietary Patterns had a higher score in the oldest age group (50–64 years), while “Dairy-sweet” Dietary Pattern scores were higher in the Young adults group (18–30 years).

Regarding sex differences, men had higher scores for “Snack” Dietary Pattern, whereas “Mediterranean” and “Dairy-sweet” Dietary Patterns had higher scores among women, adjusted for age and energy intake.

Likewise, “Mediterranean” and “Traditional” Dietary Patterns scores were significantly higher in the group of people with a higher educational level.



Lifestyle Patterns

Based on the four identified dietary patterns, as well as minutes per week spent on vigorous physical activity, moderate physical activity, walking, biking, time spent on activities considered as sedentary time, sleep duration on weekdays and smoking habits, three lifestyle patterns were identified:

- **“Mixed diet - physically active - low sedentary lifestyle” Pattern:** characterized by a greater adherence to the “Mediterranean” and “Snack” Dietary Patterns. It also has a higher level of both vigorous and moderate physical activity and spends more time on walking. On the contrary, it has low scores relating to the time spent on activities considered as sedentary time, as well as sleep duration.

This pattern included 13 % of the sample, with a higher proportion of the male population (71.9 % of men facing 28.1 % of women) and in which the age group of those aged 50 to 64 years had a significantly lower proportion. Furthermore, rates of overweight were significantly higher in this group, however, those differences were not significant in the stratified analysis by age and gender.

As to consumption of food and beverages individually, this pattern is characterized by higher consumption of fruits, pasta, olive oil, water and alcoholic beverages.

- **“Not poor diet - low physical activity - low sedentary lifestyle” Pattern:** characterized by a low adherence to “Dairy-sweet” and “Snack” dietary patterns, in which less time was spent on vigorous physical activity and activities considered as sedentary time. In addition, this was not related to smoking habits.

This pattern includes 63.3 % of the sample of all ages (18 to 64 years), with a significantly higher percentage of women (58.5 %), as well as a higher proportion of people with a lower educational level. Moreover, prevalence rates of obesity were significantly higher here, although these differences were not significant in the stratified analysis by age and gender.

- **“Poor diet - low physical activity - sedentary lifestyle” Pattern:** characterized by a greater adherence to the “Dairy-sweet” and “Snack” dietary patterns and more time spent on sedentary time. On the contrary, this pattern is also characterized by low moderate and vigorous physical activity.

This pattern included 23.6 % of the total sample and a higher proportion of young adults aged 18 to 30 years.

Regarding food and beverages consumption, people included in this group had a high consumption of milk, bakery and pastry, sugars and sweets. Men had a higher consumption of pre-cooked deep fried foods and high alcohol content beverages, whereas women were characterized by a significantly higher consumption of savory snacks, juices sugar sweetened soft drink beverages.



Gender, age, group, educational level, geographical area and BMI by lifestyle pattern

Characteristics	"Mixed diet - physically active - low sedentary lifestyle" Pattern		"Not poor diet - low physical activity - low sedentary lifestyle" Pattern		"Poor diet - low physical activity - sedentary lifestyle" Pattern		p
	n	%	n	%	n	%	
Total sample	210	13	1.020	63.3	381	23.6	
Gender							0.000
Men	151	71.9	423	41.5	204	53.5	
Women	59	28.1	597	58.5	177	46.5	
Age group							0.000
18-30 years	61	29.0	213	20.9	139	36.5	
31-49 years	110	52.4	487	47.7	183	48.0	
50-64 years	39	18.6	320	31.4	59	15.5	
Educational level							0.000
Primary or less education	55	26.2	304	29.8	73	19.2	
Secondary education	95	45.2	507	49.7	189	49.6	
Higher education	60	28.6	209	20.5	119	31.2	
Geographical area							0.577
North-northwest	36	17.1	166	16.3	74	19.4	
Eastern-Mediterranean	70	33.3	350	34.3	127	33.3	
Center	48	22.9	233	22.8	96	25.2	
South	56	26.7	271	26.6	84	22.0	
IMC							0.002
Normal weight	88	41.9	385	37.7	177	46.5	
Overweight	90	42.9	386	37.8	136	35.7	
Obese	32	15.2	249	24.4	68	17.8	

Physical activity, sedentary behaviors, sleep time on weekdays, smoking and dietary behavior in the lifestyle patterns by gender

	“Mixed diet - physically active - low sedentary lifestyle” Pattern*	“Not poor diet - low physical activity - low sedentary lifestyle” Pattern*	“Poor diet - low physical activity - sedentary lifestyle” Pattern*	p
Men (n = 778)	n = 151	n = 423	n = 204	
“Traditional DP” score	0.04 ± 1.03	0.05 ± 1.04	-0.03 ± 0.95	0.314
“Mediterranean DP” score	0.25 ± 1.35	-0.17 ± 1.00	-0.12 ± 0.96	0.000
“Snack DP” score	0.66 ± 1.29	0.14 ± 0.95	0.46 ± 1.14	0.000
“Dairy-sweet DP” score	0.05 ± 0.99	-0.49 ± 0.61	1.03 ± 1.21	0.000
Walking (min/week)	447.8 ± 434.4	284.7 ± 291.7	240.7 ± 274.9	0.000
Moderate Physical Activity (min/week)	478.4 ± 426.9	321.1 ± 360.1	174.1 ± 234.8	0.000
Vigorous Physical Activity (min/week)	706.4 ± 291.7	81.8 ± 127.3	102.3 ± 155.4	0.000
Time spent on sedentary time (h/day)	3.6 ± 2.0	4.4 ± 2.3	7.1 ± 3.7	0.000
Sleeping (h/day)	6.6 ± 2.3	7.1 ± 1.9	7.0 ± 2.0	0.021
Smoking (cig/day)	4.3 ± 6.9	6.4 ± 8.7	3.1 ± 6.0	0.000
Women (n = 883)	n = 59	n = 597	n = 177	
“Traditional DP” score	-0.3 ± 1.02	0.02 ± 0.96	-0.12 ± 1.0	0.001
“Mediterranean DP” score	0.33 ± 1.06	0.03 ± 0.89	0.09 ± 0.92	0.001
“Snack DP” score	-0.2 ± 0.94	-0.38 ± 0.75	-0.12 ± 0.82	0.001
“Dairy-sweet DP” score	0.03 ± 0.74	-0.33 ± 0.60	1.16 ± 0.89	0.000
Walking (min/week)	528.6 ± 264.1	267.0 ± 270.2	247.5 ± 263.0	0.000
Moderate Physical Activity (min/week)	740.3 ± 399.6	545.8 ± 442.9	316.9 ± 332.2	0.000
Vigorous Physical Activity (min/week)	692.0 ± 325.3	45.9 ± 92.2	57.8 ± 120.2	0.000
Time spent on sedentary time (h/day)	3.6 ± 2.1	4.0 ± 2.2	6.6 ± 4.1	0.000
Sleeping (h/day)	6.2 ± 2.5	7.1 ± 1.9	7.0 ± 2.2	0.002
Smoking (cig/day)	2.5 ± 5.6	3.9 ± 7.0	2.3 ± 5.2	0.011

General linear models adjusted for age and energy intake were used to compare dietary pattern scores.

*Mean ± Standard Deviation.

DP: Dietary Pattern



Consumption of selected food and beverages groups and subgroups by lifestyle pattern in men

	"Mixed diet - physically active - low sedentary lifestyle" Pattern*	"Not poor diet - low physical activity - low sedentary lifestyle" Pattern*	"Poor diet - low physical activity - sedentary lifestyle" Pattern*	p
Men (n = 778)	n = 151	n = 423	n = 204	
Vegetables (g/day)	184.9 ± 110.9	185.1 ± 112.4	178.2 ± 97.2	0.374
Fruits (g/day)	183.1 ± 231.0	145.0 ± 172.7	139.5 ± 144.0	0.040
Pulses (g/day)	16.7 ± 23.1	16.2 ± 19.1	13.6 ± 18.2	0.113
Meat (g/day)	127.2 ± 92.3	109.8 ± 75.3	124.9 ± 77.4	0.573
Processed and cold meats (g/day)	55.8 ± 46.6	42.5 ± 36.0	50.3 ± 39.1	0.086
Fish (g/day)	73.6 ± 90.8	62.5 ± 66.9	55.8 ± 57.1	0.050
Eggs (g/day)	40.8 ± 46.4	32.5 ± 33.4	28.3 ± 30.4	0.000
Milk (mL/day)	155.5 ± 122.9	125.6 ± 100.7	267.5 ± 178.5	0.000
Cheese (g/day)	25.4 ± 41.4	15.8 ± 20.0	19.2 ± 22.2	0.013
Yoghourt (g/day)	62.3 ± 74.5	42.3 ± 64.2	46.2 ± 62.0	0.027
Pasta (g/day)	22.6 ± 27.5	16.2 ± 20.0	17.7 ± 20.2	0.047
Bread (g/day)	94.4 ± 57.4	83.6 ± 44.6	97.5 ± 58.2	0.318
Cakes and pastry (g/day)	30.3 ± 36.1	21.1 ± 25.7	57.8 ± 46.3	0.000
Sugars and sweets (g/day)	15.0 ± 15.4	10.0 ± 9.8	24.7 ± 18.5	0.000
Pre-cooked foods (g/day)	73.0 ± 83.0	76.3 ± 86.9	80.0 ± 91.3	0.032
Savory snacks (g/day)	6.1 ± 12.1	4.7 ± 10.1	7.5 ± 14.3	0.603
Olive oil (mL/day)	20.0 ± 8.9	18.0 ± 8.8	17.3 ± 7.5	0.002
Juices (mL/day)	71.0 ± 123.9	40.0 ± 79.8	88.6 ± 175.4	0.221
Sugar sweetened soft drinks (mL/day)	104.2 ± 151.5	97.7 ± 186.7	127.2 ± 192.2	0.088
Water (mL/day)	843.4 ± 647.7	638.0 ± 537.2	757.4 ± 582.2	0.027
Alcoholic beverages (mL/day)	186.1 ± 259.4	176.4 ± 241.2	102.7 ± 181.9	0.000
Low alcohol content beverages (mL/day)	1.6 ± 5.7	2.8 ± 11.6	3.4 ± 19.4	0.050
High alcohol content beverages (mL/day)	184.5 ± 257.6	173.6 ± 238.8	99.3 ± 177.3	0.000

General linear models were used to estimate multivariate means for food consumption across lifestyle patterns adjusted for age and energy intake.

* Mean ± Standard Deviation.

Consumption of selected food and beverages groups and subgroups by lifestyle pattern in women

	"Mixed diet - physically active - low sedentary lifestyle" Pattern*	"Not poor diet - low physical activity - low sedentary lifestyle" Pattern*	"Poor diet - low physical activity - sedentary lifestyle" Pattern*	p
Women (n = 833)	n = 59	n = 597	n = 177	
Vegetables (g/day)	168.5 ± 90.6	195.3 ± 115.3	174.4 ± 110.4	0.006
Fruits (g/day)	186.5 ± 175.6	162.4 ± 173.0	143.8 ± 147.0	0.395
Pulses (g/day)	10.9 ± 13.8	14.7 ± 18.7	13.6 ± 24.2	0.239
Meat (g/day)	78.8 ± 63.1	90.9 ± 63.4	101.6 ± 70.1	0.129
Processed and cold meats (g/day)	37.1 ± 31.5	33.5 ± 30.1	37.5 ± 32.2	0.206
Fish (g/day)	55.4 ± 50.4	59.8 ± 62.9	58.1 ± 65.9	0.868
Eggs (g/day)	25.9 ± 26.3	25.0 ± 24.7	24.5 ± 24.2	0.224
Milk (mL/day)	175.0 ± 104.7	148.2 ± 103.1	271.2 ± 138.3	0.000
Cheese (g/day)	20.1 ± 20.5	15.1 ± 17.1	18.7 ± 21.3	0.276
Yoghourt (g/day)	53.9 ± 56.7	43.7 ± 57.2	51.4 ± 58.7	0.079
Pasta (g/day)	18.7 ± 20.5	14.5 ± 19.1	15.4 ± 19.7	0.171
Bread (g/day)	64.8 ± 38.4	65.7 ± 39.6	66.7 ± 33.7	0.000
Cakes and pastry (g/day)	31.6 ± 37.1	20.9 ± 22.6	56.3 ± 40.9	0.000
Sugars and sweets (g/day)	15.6 ± 12.4	11.3 ± 11.3	30.2 ± 25.0	0.000
Pre-cooked foods (g/day)	63.1 ± 77.6	61.1 ± 71.6	58.0 ± 61.5	0.011
Savory snacks (g/day)	5.9 ± 9.6	3.4 ± 7.4	9.0 ± 14.8	0.001
Olive oil (mL/day)	17.2 ± 8.2	17.9 ± 7.8	17.3 ± 8.5	0.001
Juices (mL/day)	51.0 ± 80.5	32.5 ± 60.0	61.3 ± 86.8	0.036
Sugar sweetened soft drinks (mL/day)	60.5 ± 130.2	77.9 ± 149.7	96.4 ± 159.7	0.029
Water (mL/day)	764.2 ± 563.1	649.0 ± 474.2	753.6 ± 560.2	0.009
Alcoholic beverages (mL/day)	84.4 ± 132.5	68.5 ± 141.6	47.0 ± 100.4	0.000
Low alcohol content beverages (mL/day)	1.1 ± 4.1	1.4 ± 10.5	1.6 ± 7.3	0.220
High alcohol content beverages (mL/day)	83.3 ± 131.2	67.2 ± 140.5	45.5 ± 97.8	0.000

General linear models were used to estimate multivariate means for food consumption across lifestyle patterns adjusted for age and energy intake.

* Mean ± Standard Deviation.



Analysis of dietary patterns as nutritional epidemiology approach

Analysis of dietary patterns has become an important approach in food consumption studies and nutritional epidemiology. There are different methodological approaches and procedures to identify diet and lifestyle patterns, such as factor analysis, cluster analysis and, more recently, hybrid methods.

Some pieces of research (such as DORICA study, Food4Me Project in Spain or the Baltimore Study in USA) have identified lifestyle patterns associated to specific phenotypes and obesity in several population groups, thus contributing to unravel the consequences that different diets may have on health.

Another publication of the ANIBES Study also used this procedure to identify dietary and lifestyle patterns in Spanish children and adolescents. In that study, two patterns were identified: an “unhealthier lifestyle” pattern characterized by a combination of low physical activity and poorer diet, and a “healthier lifestyle” pattern characterized by a low sedentary behaviour, longer sleep duration and healthier diet.

Co-occurrence of factors

The findings in this study underline the importance of designing and implementing interventions that address multiple health risk habits, considering lifestyle patterns, clustering of risk behaviours and associated determinants.

As shown in this study, each individual may follow a variety of unhealthy lifestyle behaviours, which combine to favour weight gain. Likewise, they might also have a mixture of healthy and unhealthy practices.

In this way, interventions which target more than one risk behaviour can have the potential for greater health benefits, enhance health promotions opportunities and can contribute to reduce related health care costs. Such an approach allows for more adequate tailoring of interventions to the profile of each group of individuals in similar conditions and helps to address health inequalities, reinforcing policies to ensure access especially to socially-disadvantaged groups.

Although prospective research on large population samples would be desirable to further analyse over the long term the lifestyle patterns and how they influence the development of overweight and obesity, these behaviour patterns are helpful to identify specific issues in population subgroups and implement intervention strategies.

Further research is needed on factors associated with lifestyle patterns to gain insight in the population subgroups at higher risk.



References

Aranceta-Bartrina J, Pérez-Rodrigo C, Serra-Majem LI, Tur-Marí JA, Mataix-Verdú J, Tojo-Sierra R, Ribas-Barba L, Martínez-de Vitoria E, Millán-Núñez-Cortés J. Dieta y riesgo cardiovascular en España: Estudio DORICA (III). On: Dieta y Riesgo Cardiovascular. Estudio DORICA II; Aranceta J, Foz M, Gil B, Jover E, Mantilla T, Monereo S, Moreno B. Madrid: Eds Médica Panamericana; 2007, p. 121-162.

López-Sobaler AM, Rodríguez-Rodríguez E, Aranceta-Bartrina J, Gil A, González-Gross M, Serra-Majem LI, Varela-Moreiras G, Ortega RM. General and abdominal Obesity is related to physical activity, smoking and sleeping behaviours and mediated by the educational level: Findings from the ANIBES Study in Spain. PLoS ONE, 2016;11(2):1-13; doi:10.1371/journal.pone.0169027.

López-Sobaler AM, Aparicio A, Aranceta-Bartrina J, Gil A, González-Gross M, Serra-Majem LI, Varela-Moreiras G. Overweight and General and Abdominal Obesity in a Representative Sample of Spanish Adults: Findings from the ANIBES Study. BioMed Research International, 2016;2016:8341487; doi:10.1155/2016/8341487.

Mielgo-Ayuso J, Aparicio-Ugarriza R, Castillo A, Ruiz E, Ávila JM, Aranceta-Bartrina J, Gil A, Ortega RM, Serra-Majem LI, Varela-Moreiras G, González-Gross M. Physical Activity Patterns of the Spanish Population Are Mostly Determined by Sex and Age: Findings in the ANIBES Study. PLoS ONE, 2016;11(2):1-22; doi:10.1371/journal.pone.0149969.

Newby PK, Muller D, Halfrisch J, Andrés R, Tucker KL. Food patterns measured by factor analysis and anthropometric changes in adults. Am J Clin Nutr, 2004;80(2):504-13.

Pérez-Rodrigo C, Gil A, González-Gross M, Ortega RM, Serra-Majem LI, Varela-Moreiras G, Aranceta-Bartrina J. Clustering of Dietary Patterns, Lifestyles, and Overweight among Spanish Children and Adolescents in the ANIBES Study. *Nutrients*, 2016;8(1,11):1-17; doi:10.3390/nu8010011.

Pérez-Rodrigo C, Gianzo-Citores M, Gil A, González-Gross M, Ortega RM, Serra-Majem LI, Varela-Moreiras G, Aranceta-Bartrina J. Lifestyle Patterns and Weight Status in Spanish Adults: The ANIBES Study. *Nutrients*, 2017;9(6):606; doi:10.3390/nu9060606.

Ruiz E, Ávila JM, Castillo A, Valero T, del Pozo S, Rodríguez P, Aranceta-Bartrina J, Gil A, González-Gross M, Ortega RM, Serra-Majem LI, Varela-Moreiras G. Energy Intake, Profile, and Dietary Sources in the Spanish Population: Findings of the ANIBES Study. *Nutrients*, 2015;7:4739-4762; doi:10.3390/nu7064739.

Ruiz E, Ávila JM, Castillo A, Valero T, del Pozo S, Rodríguez P, Aranceta-Bartrina J, Gil A, González-Gross M, Ortega RM, Serra-Majem LI, Varela-Moreiras G. The ANIBES Study on Energy Balance in Spain: Design, Protocol and Methodology. *Nutrients*, 2015;7:970-998; doi:10.3390/nu7020970.

San-Cristóbal R, Navas-Carretero S, Celis-Morales C, et al. Analysis of Dietary Pattern Impact on Weight Status for Personalised Nutrition through On-Line Advice: The Food4Me Spanish Cohort. *Nutrients*, 2015;7(11):9523-9537; doi:10.3390/nu7115482.

Varela-Moreiras G, Ávila JM, Ruiz E. Energy Balance, a new paradigm and methodological issues: the ANIBES Study in Spain. *Nutr Hosp*, 2015;31(3):101-112; doi:10.3305/nh.2015.31.



Scientific Committee

- **Prof. Javier Aranceta-Bartrina, MD, PhD**
Chairman of the Scientific Committee of the Spanish Society of Community Nutrition (SENC), Clinical Director of the Spanish Foundation for Nutritional Research (FIN) and Professor of Community Nutrition at the University of Navarra
- **Prof. Ángel Gil, PhD**
Chairman of the Iberoamerican Nutrition Foundation (FINUT), Director of the BioNit Scientific Group and Professor of Biochemistry and Molecular Biology at the University of Granada
- **Prof. Marcela González-Gross, PhD**
Vice President of the Spanish Nutrition Society (SEÑ), Head of the imFine Research Group and Professor of Sports Nutrition and Exercise Physiology at the Technical University of Madrid
- **Prof. Rosa M^a Ortega, PhD**
Director of the VALORNUT Research Group and Professor of Nutrition at the Complutense University of Madrid
- **Prof. Lluís Serra-Majem, MD, PhD**
Chairman of the Spanish Foundation for Nutritional Research (FIN), Chairman of the Spanish Nutrition and Food Sciences Academy (AEN), Director of the Biomedical and Health Research Institute and Professor of Preventive Medicine and Public Health at the University of Las Palmas de Gran Canaria
- **Prof. Gregorio Varela-Moreiras, PhD**
Chairman of the Spanish Nutrition Foundation (FEN), Director of the Nutrition and Food Sciences Research Group (CEUNUT) and Professor of Nutrition and Bromatology at CEU San Pablo University of Madrid

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



ANIBES