

ARTICLE



Nutrition and Health (including climate and ecological aspects)

Effects of COVID-19 lockdown on the dietary habits and lifestyle in a population in southern Spain: a cross-sectional questionnaire

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BACKGROUND/OBJECTIVE: Few studies have assessed the effect of lockdown on physical activity and eating behaviours in a population from the Autonomous Community of Andalusia in southern Spain. The aim of our study was to describe the effect of COVID-19 pandemic home lockdown on eating habits and lifestyle in the Andalusian population.

SUBJECTS/METHODS: A cross-sectional observational study was carried out on a population from southern Spain, Andalusian population. An online questionnaire was shared through social networks and snowball sampling. A total of 1140 people filled in the questionnaire. The questionnaire consisted of 34 items classified into three sections: sociodemographic data, work and leisure activities and questions on food consumption. Each item offered pre- and post-lockdown information.

RESULTS: The participants were classified into three age groups: 18–35, 36–65 and over 65. Statistically significant differences were found between the three groups, with the younger age group undergoing greater changes, increasing their physical activity and consumption of fresh food, and decreasing both their consumption of fast food at home and alcohol intake.

CONCLUSIONS: These findings suggest that, in the current social and health crisis, the citizens of southern Spain have become aware of the importance of maintaining an appropriate lifestyle to remain healthy, particularly the younger population with less well-consolidated habits.

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INTRODUCTION

On 31 December 2019, a cluster of cases of SARS-CoV-2 viral pneumonia, referred to as COVID-19, was reported in the Chinese region of Wuhan [1]. With 161,237 confirmed cases and 6000 deaths [2], in March 2020, the World Health Organisation (WHO) declared a global pandemic [1].

In Spain, on 14 March 2020, to curb the increase in cases and the collapse of the healthcare system, a state of alarm was declared [3]. This declaration obliged the entire Spanish population to remain at home, allowing them to go out only to buy basic products, with the exception of people working jobs classified as essential. Initially, 15 days of house lockdown was imposed, which was eventually extended to 50 days. The entry into force of this lockdown motivated a social urgency to hoard food and household supplies to provide for homes in the days after 14 March. This was characterised by the compulsive purchase of pulses, beer and hygiene articles, resulting in shortages of basic products [4].

Numerous studies reflect the appearance of stress in people as a result of the lockdown [5, 6]. In turn, a relationship has been found between situations of stress and uncertainty, and the consumption of hyperpalatable foods [7, 8]. The first published

data on consumption in the initial weeks of the lockdown and the weeks prior to it report a disproportionate increase in the purchase of food, with some non-perishable foodstuffs even increasing by 100% compared to the same month of the previous year [4, 9–11]. In this context, the WHO published guidelines on healthy eating [12] with the intention of preventing further negative effects of the pandemic deriving from an unhealthy diet, such as overweight and obesity, which are involved in the development of non-communicable diseases [13].

In addition, the WHO also published recommendations highlighting the importance of regular physical activity, its benefits for the body and mind, as well as its involvement in lower morbidity and mortality rates [14].

The first published studies warned, as expected, of changes in eating habits, including increased snacking, a greater number of meals consumed and changes in the weight of the participants and their physical activity levels, with two distinct trends; on the one hand, there were many who decreased their daily exercise [15, 16], while there was also a significant number of people who increased their physical activity over this period [17]. These habit changes depended largely on age. In this sense, in the area of

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Developmental Psychology there are three major stages in adulthood: the youth stage, between approximately 20 and 40 years of age; the mature stage, between 40 and 65, and finally the over 65s. The first stage is a period characterised by the appearance of a certain independence from the family, including a period of higher education and incorporation into the world of work. This decreases available time, and food is pushed into the background. The second stage is based on assuming and overcoming responsibilities, as well as social commitments, developing a certain emotional and work stability. The older stage is characterised by more rigid thinking, with less flexibility and greater rejection of changes involve in altered routines, as well as the cessation of working activity [18, 19]. In Spain, people generally retire between 65 and 67 years of age [20].

Despite the volume of research published so far, few studies have evaluated the effect of lockdown on the physical activity and eating behaviours of the population from the Autonomous Community of Andalusia, in southern Spain. The aim of our work is, therefore, to describe the effect of COVID-19 pandemic home lockdown on the dietary habits and lifestyle of the Andalusian population, to prevent any negative impact of future outbreaks and subsequent lockdown measures.

MATERIALS AND METHODS

Study design

A cross-sectional observational study was carried out on a population from southern Spain, Andalusian population. Access was provided to an anonymous online questionnaire, which was active from 21 April (the sixth week of lockdown) until 2 May 2020, coinciding with the start of the lockdown de-escalation in Spain. The questionnaire was shared via social networks such as Instagram, Facebook, WhatsApp, virtual classrooms in which the researchers themselves were teaching, as well as by email, making snowball sampling possible. The questionnaire could be completed using any mobile device, tablet or computer. In addition, the number of days the participants had been confined to their homes, from the start of lockdown to the time they filled in the survey, was taken into account.

Population

The study population consisted of adults of 18 years of age or above, who used digital technology. The start of the questionnaire included a brief description of the purpose of the survey, information about the researchers responsible and the fact that the data collected would be both anonymous and confidential. Filling in the questionnaire was completely voluntary. In addition, the participants were able to leave the study at any time before submitting the survey. Responses were saved only when the submit button was clicked.

Data collection

The data were collected by means of a structured self-administered questionnaire, created on the Google Form platform. This questionnaire collected the questions to be answered sequentially and according to the scenarios 'before' and 'during' lockdown. It included 34 items and was divided into three main sections, organised as follows: one section on sociodemographic data; a second section containing questions about general habits, work and leisure activities; and finally, questions to determine variation in food consumption. The sociodemographic information collected included the variables age, sex, educational level, place where the lockdown was taking place, people with whom the participants were living at that time, information on the home they were confined to, their employment situation and the need to go out to work, as well as changes in financial income and body weight. The second section included questions on sleep habits and physical activity levels. The items referring to eating habits were: eating schedules and the number of meals/day, snacking between meals, consumption of ultra-processed food groups, fast food at home and the consumption of fresh food. Finally, we included questions aimed at investigating changes in the frequency of food consumption, with the intention of finding out whether the participants had increased, decreased or maintained their habits, for which we presented the foods organised into rows with four possible response

options: no consumption, more, less or the same level. These foods included beverages such as soft drinks, stimulant drinks and alcohol.

Data analysis

The participants were divided into three groups according to their age; a first group of participants aged between 18 and 35, a second group between 36 and 65 and, finally, those over 65 years of age, according to the classification of the Spain's National Institute of Statistics [21]. Quantitative variables were analysed using a one-way ANOVA and qualitative variables were analysed using a χ^2 test, both with a significance of 0.05. Odds ratios were calculated using binary logistic regression analysis with dietary assessment (less or the same vs. more) as the dependent variable (confidence intervals at 95%). The first step included models evaluating the relationship between each determinant and the assessment of food, less or the same versus more and the corresponding odds ratio, adjusted for the following variables: modified weight, degree of physical activity, amount of food and modified sleep. In the second step, the odds ratios were adjusted for sex and educational level. The normality of the distributions was checked using the Kolmogorov-Smirnov test. The significance level was $p < 0.05$. All of the analyses were performed with version 24 of the SPSS software package (IBM, Armonk, NY, USA).

RESULTS

Table 1 shows the sociodemographic characteristics of the participants classified into three age groups: 18–35, 36–65 and over 65 years of age. A total of 1140 people participated, all of whom were of legal age. Highly significant statistical differences ($p < 0.001$) were found between the three age groups in relation to the number of cohabitants, leaving the home to go to work and the reduction of income during lockdown.

In relation to the habits of the participants (Table 2), statistically significant differences were found ($p < 0.001$) and ($p < 0.05$), in all the items presented between the different age ranges. In relation

Table 1. Sociodemographic characteristics of the participants by age group.

Variables	18–35 years	36–65 years	>65 years	Total
Days of lockdown (mean \pm SD)	39.4 \pm 7.10	37.7 \pm 7.58	41.7 \pm 5.87	38.7 \pm 7.35
Sex ^a $p = 0.311$				
Woman	471 (55.8%)	362 (42.9%)	11 (1.3%)	844
Man	143 (49.7%)	138 (47.9%)	7 (2.4%)	288
Studies ^b $p = 0.283$				
Not higher	260 (51.8%)	233 (46.4%)	9 (1.8%)	502
Higher	360 (56.4%)	269 (42.2%)	9 (1.4%)	638
No. of people living together $p < 0.001$				
Alone	42 (35%)	75 (62.5%)	3 (2.5%)	120
With others	578 (56.7%)	427 (41.9%)	15 (1.5%)	1020
House m^b $p = 0.741$				
<60	46 (58.2%)	33 (41.8%)	0	79
61–90	227 (54.4%)	184 (44.1%)	6 (1.4%)	417
>91	347 (53.9%)	285 (44.3%)	12 (1.9%)	644
During lockdown, income has been reduced ^c $p < 0.001$				
Yes	316 (57.0%)	236 (42.6%)	2 (0.4%)	554
No	276 (51.4%)	248 (46.2%)	13 (2.4%)	537
Due to your working situation, do you have to leave home to go to work? $p < 0.001$				
Yes	108 (43.5%)	139 (56.0%)	1 (0.4%)	248
No	512 (57.4%)	363 (40.7%)	17 (1.9%)	892

^aThe figures do not coincide because 8 respondents preferred not to answer the sex question.

^bHigher (diploma, degree, university degree, master's degree, and doctorate) and not higher (from primary studies to baccalaureate, including vocational training).

^cThe figures do not coincide because there were 49 respondents who preferred not to answer the income reduction question.

to weight change during lockdown, more than half of the participants reported that their weight changed over this period.

In terms of frequency of food consumption (Tables 3–5), statistically significant differences were found ($p < 0.001$ and $p < 0.05$) with respect to age ranges for cereals and derivatives, both refined and wholemeal, sweets and pastries, potatoes, pulses, nuts, milk and dairy products, lean meats, cold cuts and sausages, lean and fatty fish, seafood, seed oils other than olive oil, precooked foods, stimulant drinks and alcoholic beverages. In the case of alcoholic beverages, a third of all participants reported a decrease in their consumption, with this reduction being greatest among the youngest group, where there was a 50% drop.

Table 6 shows the different relationships between the assessment of eating and the variables: modified weight, level of physical activity, amount of food consumed and modified sleep. When diet was assessed in relation to physical activity, there was a positive association (OR = 2.56, 95% CI = 1.96; 3.34), i.e., people who were more physically active were two and a half times more likely to evaluate their diet positively. On the other hand, there was a negative association with regard to quantity eaten (OR = 0.60, 95% CI = 0.46; 0.78), meaning that eating was negatively valued among those who ate more food. The same degree of association holds for both the raw and adjusted data, in such a way that, when corrected for sex and educational level, the OR increased slightly in both cases, and the CIs remained virtually unchanged.

DISCUSSION

The global COVID-19 pandemic led to home isolation measures in many parts of the world. Changes in dietary patterns have been identified as a result of this lockdown, as well as lifestyle changes that affect sleep and physical activity. As in other studies, our data show that a small number of people spent the lockdown alone, which is consistent with other studies [16, 22, 23]. Age is shown to be a determining factor in the changes observed; around 50% of those surveyed who are of working age have seen their income reduced as a result of the shutdown of non-essential activity, as demonstrated by the National Statistics Institute in Spain [24, 25]. With the closure of non-essential activity and the shift to online education, few people had to leave home to go to their workplace. This affected the middle-aged population to the greatest extent, as they have more stable jobs, similarly to that reported in other work [17].

In terms of body weight, most of the participants claim to have undergone changes, coinciding with that described by Canello et al. [16] in their study on an Italian population. In this sense, the population over 35 years of age considers that they have undergone fewer changes in their eating habits. The Kantar report [26] shows that as the weeks of lockdown passed, consumers became more aware of the importance of healthier, waste-free eating and gained an interest in getting into the kitchen to make healthy dishes, results that are consistent with those from another study conducted in France over the same weeks [27]. In view of our data, it is possible to think that the same phenomenon occurred; a progressive awareness of the importance of food. However, we could also consider that the preparation of healthy dishes served as an escape and a way to keep busy [16, 23, 28, 29].

On a general level, the participants consumed more food as they had more time, quicker access to food and greater stress levels [7, 30–32]. To cope with this high demand for products, all links in the food production chain had to adapt rapidly [4, 33]. Related to this higher level of consumption is the group of 18–35-year olds who claimed to have increased the variety in their diets; they are the most irregular in terms of schedule, and they are the group who showed the greatest increase in the number of meals eaten every day. The Ministry of Agriculture, Fisheries and Food

(MAPA) described increased food consumption in Spanish households over the lockdown weeks compared to the same time last year [4], although it did not indicate whether there were age-linked differences. Coinciding with these data, half of our participants snacked more between meals, similarly to that reported in other research [34]; however, in the study by Rodríguez-Pérez et al. [35] also involving a Spanish population, almost half of the participants claimed to have maintained their habits, showing similar patterns to the pre-confinement stage. As for the type of food consumed, almost a third of respondents increased their consumption of fresh food and reduced their purchase of packaged products, which are presented as less perishable and fast food served at home. This may be due to the fact that one of the few activities permitted was going shopping, combined with increased time spent on cooking and a certain fear of being infected by home deliverers [36, 37]. Indeed, in this sense, measures were established for the catering industry to limit the risk of contagion [38].

Around a quarter of the participants increased their consumption of food groups like cereals, tubers, legumes, meats and cold cuts, as well as dairy products, figures that are in line with those published in the Smart Agrifood report [33]. This growth was higher in the 18–35 age group, as reflected in another study conducted on a Polish population [34]. In addition, almost half of the participants increased their intake of so-called comfort foods (sweets and pastries), just as in other populations studied [30], and almost a third increased their consumption of nuts, information that is reflected in the MAPA report [4]. At the same time, we observed a decrease in the consumption of seafood, especially in the 36–65 age group, and among the youngest, we detected a more pronounced decrease in the consumption of precooked foods, stimulant and alcoholic beverages, as well as cereals and whole-grain products. Although purchases of alcohol and spirits rose slightly, this is far less than the number of beverages purchased for consumption outside the home in the pre-pandemic period, coinciding with that reported in other studies [4, 39, 40]. In our study, the greatest drop in consumption was seen in the 18–35-year olds. This trend change could be explained by the impossibility of having interpersonal relationships and doing leisure activities outside the home. Overall, these findings are in line with those described by previous studies [16, 17, 34, 35] that describe decreased alcohol consumption in the general population.

On the other hand, more than half of the participants experienced changes in their sleep pattern, again consistent with the results described by other studies [16, 22, 27, 41–43], and which could be explained by changes in lifestyle, the situation of uncertainty generated by the impending economic recession and the social and health crisis in the country. In terms of age, the youngest participants had the most disturbed sleep patterns. In this sense, Mandelkorn et al. [44] in their study of adult populations in 49 countries found that people over 60 years of age are less likely to develop sleep disorders during periods of lockdown. Furthermore, they observed that the sample Spanish population had a much higher rate of sleep disorders than individuals in other countries, and that this could be related to a lack of physical activity.

In this context, when the State of Alarm was introduced [3], which prohibited people from leaving their homes for unjustified reasons, the WHO, anticipating a decline in physical activity among citizens, published guidelines advocating the need to maintain daily physical activity during the lockdown period [14]. However, different studies [16, 22, 35, 43] show that during the pandemic few people actually increased their physical activity level. Indeed, studies such as that developed by Mattioli et al. [45] warn of the negative effects of not engaging in physical activity during the pandemic, including the appearance of metabolic disorders that increase cardiovascular risk, impaired aerobic

Table 2. Habits before and during lockdown by age group.

Variables	18–35 years	36–65 years	>65 years	Total
<i>Weight change p = 0.001</i>				
Yes	321 (55.2%)	255 (43.9%)	5 (0.9%)	581
No	160 (47.8%)	164 (49.0%)	11 (3.3%)	335
<i>Has your sleep pattern changed? p < 0.001</i>				
Yes	492 (60.1%)	319 (39.0%)	7 (0.9%)	818
No	128 (39.8%)	183 (56.8%)	11 (3.4%)	322
<i>Do you find it more difficult to fall asleep? p < 0.05</i>				
Yes	409 (58.1%)	288 (40.9%)	7 (1.0%)	704
No	211 (49.1%)	214 (48.4%)	11 (2.5%)	436
<i>Assessment of your diet p < 0.001</i>				
Better	206 (63.4%)	119 (36.6%)	0	325
Worse	229 (58.3%)	164 (41.7%)	0	393
The same	185 (43.8%)	219 (51.9%)	18 (4.3%)	422
<i>Level of physical activity p < 0.001</i>				
Better	273 (71.1%)	109 (28.4%)	2 (0.5%)	384
Worse	167 (45.3%)	196 (53.1%)	6 (1.6%)	369
The same	180 (46.5%)	197 (50.9%)	10 (2.6%)	387
<i>Amount of food p < 0.001</i>				
More	286 (55.2%)	231 (44.6%)	1 (0.2%)	518
Less	94 (64.4%)	50 (34.2%)	2 (1.4%)	146
The same	240 (50.4%)	221 (46.4%)	15 (3.2%)	476
<i>Variety of food p = 0.004</i>				
More	271 (60.4%)	174 (38.8%)	4 (0.9%)	449
Less	116 (55.8%)	88 (42.3%)	4 (1.9%)	208
The same	233 (48.2%)	240 (49.7%)	10 (2.1%)	483
<i>Regularity of schedules p < 0.001</i>				
More	172 (54.3%)	143 (45.1%)	2 (0.6%)	317
Less	194 (67.1%)	95 (32.9%)	0	289
The same	254 (47.6%)	264 (49.4%)	16 (3.0%)	534
<i>Number of meals per day p < 0.001</i>				
More	201 (58.4%)	141 (41.0%)	2 (0.6%)	344
Less	107 (74.3%)	36 (25.0%)	1 (0.7%)	144
The same	312 (47.9%)	325 (49.8%)	15 (2.3%)	652
<i>Snacking between meals p < 0.001</i>				
More	263 (52.7%)	233 (46.7%)	3 (0.6%)	499
Less	147 (66.8%)	71 (32.3%)	2 (0.9%)	220
The same	210 (49.9%)	198 (47.0%)	13 (3.1%)	421
<i>Fresh food consumption p = 0.001</i>				
More	213 (62.3%)	129 (37.7%)	0	342
Less	102 (51.8%)	90 (45.7%)	5 (2.5%)	197
The same	305 (50.7%)	283 (47.1%)	13 (2.2%)	601
<i>Packaged food consumption p = 0.036</i>				
More	124 (55.9%)	93 (41.9%)	5 (2.3%)	222
Less	195 (58.0%)	141 (42.0%)	0	336
The same	301 (51.7%)	268 (46.0%)	13 (2.3%)	582
<i>Fast food consumption at home p < 0.001</i>				
More	24 (63.2%)	14 (36.8%)	0	38
Less	457 (58.6%)	319 (40.9%)	4 (0.5%)	780
The same	139 (43.2%)	169 (52.5%)	14 (4.3%)	322

Table 3. Frequency of consumption of drinks and carbohydrate-containing foods according to age group.

	18–35 years	36–65 years	>65 years	Total
<i>Cereals and derivatives (bread, pasta, rice) p < 0.001</i>				
Not consumed	12 (33.3%)	20 (55.6%)	4 (11.1%)	36
More	182 (58.1%)	127 (40.6%)	4 (1.3%)	313
Less	91 (66.4%)	45 (32.8%)	1 (0.7%)	137
The same	335 (51.2%)	310 (47.4%)	9 (1.4%)	654
<i>Cereals and whole-grain derivatives p < 0.001</i>				
Not consumed	112 (47.3%)	116 (48.9%)	9 (3.8%)	237
More	107 (59.8%)	72 (40.2%)	0	179
Less	121 (63.0%)	70 (36.5%)	1 (0.5%)	192
The same	280 (52.6%)	244 (45.9%)	8 (1.5%)	532
<i>Sweets and pastries (including breakfast cereals, chocolate and biscuits) p < 0.05</i>				
Not consumed	103 (50.7%)	94 (46.3%)	6 (3.0%)	203
More	236 (54.5%)	194 (44.8%)	3 (0.7%)	433
Less	148 (64.3%)	78 (33.9%)	4 (1.7%)	230
The same	133 (48.5%)	136 (49.6%)	5 (1.8%)	274
<i>Fruit juices (including natural) p = 0.062</i>				
Not consumed	164 (54.8%)	127 (42.5%)	8 (2.7%)	299
More	158 (59.6%)	105 (39.6%)	2 (0.8%)	265
Less	87 (56.5%)	67 (43.5%)	0	154
The same	211 (50.0%)	203 (48.1%)	8 (1.9%)	422
<i>Vegetables and salad p = 0.104</i>				
Not consumed	13 (72.2%)	5 (27.8%)	0	18
More	233 (59.1%)	157 (39.8%)	4 (1.0%)	394
Less	77 (53.1%)	64 (44.1%)	4 (2.8%)	145
The same	297 (50.9%)	276 (47.3%)	10 (1.7%)	583
<i>Potatoes p < 0.001</i>				
Not consumed	8 (21.6%)	29 (79.4%)	0	37
More	224 (60.1%)	146 (39.1%)	3 (0.8%)	373
Less	56 (55.4%)	44 (43.6%)	1 (1.0%)	101
The same	332 (52.8%)	283 (45.0%)	14 (2.2%)	629
<i>Pulses p = 0.018</i>				
Not consumed	30 (61.2%)	19 (38.8%)	0	49
More	197 (59.3%)	130 (39.2%)	5 (1.5%)	332
Less	72 (64.3%)	39 (34.8%)	1 (0.9%)	112
The same	321 (49.6%)	314 (48.5%)	12 (1.9%)	647
<i>Soft drinks p = 0.077</i>				
Not consumed	241 (55.4%)	183 (42.1%)	11 (2.5%)	435
More	112 (57.7%)	81 (41.8%)	1 (0.5%)	194
Less	118 (56.7%)	86 (41.3%)	4 (2.0%)	208
The same	149 (49.2%)	152 (50.2%)	2 (0.6%)	303
<i>Stimulant drinks (with caffeine, theine and ginseng) p < 0.05</i>				
Not consumed	330 (57.5%)	231 (40.2%)	13 (2.3%)	574
More	58 (47.5%)	64 (52.5%)	0	122
Less	109 (59.3%)	74 (39.6%)	4 (2.1%)	187
The same	123 (47.9%)	133 (51.8%)	1 (0.4%)	257
<i>Alcoholic beverages p < 0.001</i>				
Not consumed	193 (56.8%)	138 (40.6%)	9 (2.6%)	340
More	72 (38.9%)	112 (60.5%)	1 (0.5%)	185
Less	265 (73.2%)	93 (25.7%)	4 (1.1%)	362
The same	90 (35.6%)	159 (62.8%)	4 (1.6%)	253

Table 4. Frequency of consumption of protein-based food according to age group.

	18–35 years	36–65 years	>65 years	Total
<i>Milk and dairy products (yoghurt, cheese) p < 0.05</i>				
Not consumed	46 (55.4%)	36 (43.4%)	1 (1.2%)	83
More	185 (64.7%)	99 (34.6%)	2 (0.7%)	286
Less	55 (58.5%)	38 (40.4%)	1 (1.1%)	94
The same	334 (49.3%)	329 (48.6%)	14 (2.1%)	677
<i>Dairy-type beverages (soy, almond, oatmeal) p = 0.401</i>				
Not consumed	310 (54.4%)	247 (43.3%)	13 (2.3%)	570
More	65 (59.1%)	45 (40.9%)	0	110
Less	49 (57.6%)	35 (41.2%)	1 (1.2%)	85
The same	196 (52.3%)	175 (46.7%)	4 (1.1%)	375
<i>Dairy desserts (custard, flan, rice pudding, etc.) p < 0.05</i>				
Not consumed	220 (50.6%)	166 (42.2%)	7 (1.8%)	393
More	147 (58.6%)	103 (41.0%)	1 (0.4%)	251
Less	72 (60.0%)	45 (37.5%)	3 (2.5%)	120
The same	181 (48.1%)	188 (50.0%)	7 (1.9%)	376
<i>Fatty meats (pork, beef) p < 0.05</i>				
Not consumed	77 (63.1%)	45 (36.9%)	0	122
More	121 (60.5%)	76 (38.0%)	3 (1.5%)	200
Less	96 (57.5%)	69 (41.3%)	2 (1.2%)	167
The same	326 (50.1%)	312 (47.9%)	13 (2.0%)	651
<i>Lean meats (chicken, turkey, rabbit) p < 0.05</i>				
Not consumed	41 (74.5%)	14 (25.5%)	0	55
More	156 (58.9%)	106 (40.0%)	3 (1.1%)	265
Less	67 (65.7%)	34 (33.3%)	1 (1.0%)	102
The same	356 (49.6%)	348 (48.5%)	14 (1.9%)	718
<i>Sausages and cold cuts p < 0.05</i>				
Not consumed	119 (63.6%)	61 (32.6%)	7 (3.7%)	187
More	132 (54.1%)	110 (45.1%)	2 (0.8%)	244
Less	113 (58.9%)	76 (39.6%)	3 (1.6%)	192
The same	256 (49.5%)	255 (49.3%)	6 (1.2%)	517
<i>Oily fish (sardines, salmon, tuna, mackerel) p < 0.001</i>				
Not consumed	79 (75.2%)	25 (23.8%)	1 (1.0%)	105
More	143 (62.4%)	85 (37.1%)	1 (0.4%)	229
Less	117 (50.2%)	110 (47.2%)	6 (2.6%)	233
The same	281 (49.0%)	282 (49.2%)	10 (1.7%)	573
<i>Lean and semi-fatty fish (hake, cod, monkfish, gilt-head bream, sole) p < 0.001</i>				
Not consumed	80 (82.5%)	17 (17.5%)	0	97
More	159 (62.8%)	91 (36.0%)	3 (1.2%)	253
Less	113 (48.1%)	116 (49.4%)	6 (2.6%)	235
The same	268 (48.3%)	278 (50.1%)	9 (1.6%)	555
<i>Seafood p < 0.001</i>				
Not consumed	194 (68.1%)	87 (30.5%)	4 (1.4%)	285
More	56 (54.9%)	44 (43.1%)	2 (2.0%)	102
Less	140 (42.3%)	186 (56.2%)	5 (1.5%)	331
The same	230 (54.5%)	185 (43.8%)	7 (1.7%)	422
<i>Eggs p = 0.594</i>				
Not consumed	16 (57.1%)	12 (42.9%)	0	28
More	220 (55.0%)	175 (43.8%)	5 (1.2%)	400
Less	46 (63.0%)	25 (34.2%)	2 (2.8%)	73
The same	338 (52.9%)	290 (45.4%)	11 (1.7%)	639

capacity, insulin resistance and decreased muscle performance. However, despite the low expectations, in our study we found that more than two thirds of the respondents maintained or increased their physical activity, and similar values were found in a study of an Italian population, where participants who already engaged in sport prior to lockdown increased the frequency of their training [17]. In addition, in our study we found that the increase in physical activity was significantly higher among the younger age group, coinciding with that described by Pérez-Rodrigo et al. [46] in their study on a Spanish population, in which they observed greater physical activity levels during lockdown among participants aged between 18 and 34. Another study, conducted in

northern Italy, concluded that people over 30 years of age were less likely to increase their physical activity during lockdown [16].

Numerous studies have found an association between diet, physical activity and body weight control [31, 47, 48]. In our case, there was a direct relationship between a healthy diet and the practice of regular physical activity. This finding is reflected by Flanagan et al. [49], who reported that study subjects who exhibited less healthy eating during lockdown had more sedentary behaviour. Pérez-Rodrigo et al. [46] showed how people who increased their physical activity were three times more likely to reduce their food intake.

The strengths of our study include the online survey, which allowed us to reach a large number of people quickly, at a time when most of the population could not leave their homes. In addition, the results are stratified by age group, which provides a clearer picture of eating behaviour in these populational groups. The limitations of the study include the non-random sampling technique employed to reach the participants. In addition, the majority of the participants were women, something which is very common in research conducted during lockdown [23, 41]. As this was an online survey, it was not possible to find out further details related to the participants' answers.

In conclusion, our results show that, during the lockdown period, study participants from 18 to 35 years of age increased both their physical activity levels and their consumption of fresh food; they also decreased their consumption of fast food at home and reduced their overall alcohol consumption. In the group of over 65s, there were no changes in food consumption or routine despite the lockdown, and we can state that this social group has consolidated habits. Our findings suggest that, in the current social and health crisis, the citizens in southern Spain have become aware of how important maintaining appropriate lifestyles is in staying healthy, a trend that should be used by health authorities to promote strategies and interventions, either in health centres or through the use of digital tools, which allow greater adherence to healthy lifestyle habits, as it could have a positive impact on well-being physical, social and mental of the citizens before possible future home lockdown.

DATA AVAILABILITY

Due to the sensitive nature of the questions asked in this study, survey respondents were assured that raw data would remain confidential and would not be shared. Data not available/the data that have been used are confidential.

Table 5. Frequency of consumption of fat-containing foods according to age group.

	18–35 years	36–65 years	>65 years	Total
<i>Olive oil</i> $p = 0.381$				
Not consumed	5 (33.3%)	10 (66.7%)	0	15
More	159 (59.3%)	105 (39.2%)	4 (1.5%)	268
Less	28 (51.9%)	25 (46.3%)	1 (1.9%)	54
The same	428 (53.3%)	362 (45.1%)	13 (1.6%)	803
<i>Other seed oils (sunflower) and fats (butter or margarine)</i> $p < 0.05$				
Not consumed	192 (54.7%)	146 (41.6%)	13 (3.7%)	351
More	91 (56.5%)	69 (42.9%)	1 (0.6%)	161
Less	84 (60.9%)	52 (37.7%)	2 (1.4%)	138
The same	253 (51.6%)	235 (48.0%)	2 (1.4%)	490
<i>Precooked foods</i> $p < 0.05$				
Not consumed	176 (48.6%)	177 (48.9%)	9 (2.5%)	362
More	87 (61.3%)	53 (37.3%)	2 (1.4%)	142
Less	195 (62.3%)	114 (36.4%)	4 (1.3%)	313
The same	162 (50.2%)	158 (48.9%)	3 (0.9%)	323
<i>Savoury snacks</i> $p = 0.946$				
Not consumed	139 (53.9%)	114 (44.2%)	5 (1.9%)	258
More	179 (54.7%)	143 (43.7%)	5 (1.5%)	327
Less	118 (57.3%)	86 (41.7%)	2 (1.0%)	206
The same	184 (52.7%)	159 (45.6%)	6 (1.7%)	349

Table 6. Based on food assessment (less or the same vs. more).

Variable	n	%	OR	95% CI	OR ^a	95% CI
<i>Modified weight</i>						
Yes	502	72.5	1			
No	313	69.9	0.88	0.68; 1.14	0.89	0.68; 1.16
<i>Level of physical activity</i>						
Less–same	591	78.2	1			
More	224	58.3	2.56***	1.96; 3.34	2.63***	2.01; 3.45
<i>Amount of food</i>						
Less–same	416	66.9	1			
More	399	77.0	0.60***	0.46; 0.78	0.61***	0.47; 0.79
<i>Modified sleep</i>						
Yes	577	70.5	1			
No	238	73.9	1.18	0.89; 1.58	1.21	0.90; 1.62

Less or the same was taken as the reference. The data are presented as the odds ratio (OR) with 95% confidence intervals (CI) using a logistic regression model.

*** $p < 0.001$.

^aOR adjusted for sex and educational level.

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AUTHOR CONTRIBUTIONS

CFN-P, EG-J and JS-R designed research; CFN-P and ÁF-A conducted research; CFN-P provided the database; MAM-A analysed data; CFN-P, EG-J and JS-R wrote the paper; EG-J had primary responsibility for final content. All authors read and approved the final manuscript.

COMPETING INTERESTS

The authors declare no competing interests.

ETHICAL APPROVAL

The Ethical Principles established by the World Medical Association (WMA) in the Declaration of Helsinki were followed in the development of this study. This study was also in line with current Spanish legislation, the General Data Protection Regulation and Organic Law 3/2018, of 5 December, on Personal Data Protection and the guarantee of digital rights.

ADDITIONAL INFORMATION

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