

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

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26 **Abstract:**

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

32 **Subjects/Methods:** A cross-sectional observational study was carried out on a  
33 population from southern Spain, Andalusian population. An online questionnaire was  
34 shared through social networks and snowball sampling. A total of 1,140 people filled in  
35 the questionnaire. The questionnaire consisted of 34 items classified into three sections:  
36 sociodemographic data, work and leisure activities, and questions on food consumption.  
37 Each item offered pre- and post-lockdown information.

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

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

47 **Keywords:**

48 Lockdown, physical activity, diet, COVID-19, age, lifestyle, snacking, alcohol

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## 51 **1. Introduction**

52 On 31 December, 2019, a cluster of cases of SARS-CoV-2 viral pneumonia, referred to  
53 as COVID-19, was reported in the Chinese region of Wuhan <sup>1</sup>. With 161,237 confirmed  
54 cases and 6,000 deaths <sup>2</sup>, in March 2020, the World Health Organisation (WHO)  
55 declared a global pandemic <sup>1</sup>.

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

65 Numerous studies reflect the appearance of stress in people as a result of the lockdown  
66 <sup>5,6</sup>. In turn, a relationship has been found between situations of stress and uncertainty,  
67 and the consumption of hyperpalatable foods <sup>7,8</sup>. The first published data on  
68 consumption in the initial weeks of the lockdown and the weeks prior to it, report a  
69 disproportionate increase in the purchase of food, with some non-perishable foodstuffs  
70 even increasing by 100% compared to the same month of the previous year <sup>4,9-11</sup>. In this  
71 context, the WHO published guidelines on healthy eating <sup>12</sup> with the intention of  
72 preventing further negative effects of the pandemic deriving from an unhealthy diet,  
73 such as overweight and obesity, which are involved in the development of non-  
74 communicable diseases (NCDs) <sup>13</sup>.

75 In addition, the WHO also published recommendations highlighting the importance of  
76 regular physical activity, its benefits for the body and mind, as well as its involvement  
77 in lower morbidity and mortality rates <sup>14</sup>.

78 The first published studies warned, as expected, of changes in eating habits, including  
79 increased snacking, a greater number of meals consumed, and changes in the weight of  
80 the participants and their physical activity levels, with two distinct trends, on the one  
81 hand, there were many who decreased their daily exercise <sup>15,16</sup>, while there was also a  
82 significant number of people who increased their physical activity over this period <sup>17</sup>.

83 These habit changes depended largely on age. In this sense, in the area of  
84 Developmental Psychology there are 3 major stages in adulthood: The youth stage,  
85 between approximately 20 and 40 years of age; the mature stage, between 40 and 65,  
86 and finally the over 65s. The first stage is a period characterised by the appearance of a  
87 certain independence from the family, including a period of higher education and  
88 incorporation into the world of work. This decreases available time, and food is pushed  
89 into the background. The second stage is based on assuming and overcoming  
90 responsibilities, as well as social commitments, developing a certain emotional and  
91 work stability. The older stage is characterised by more rigid thinking, with less  
92 flexibility and greater rejection of changes involve in altered routines, as well as the  
93 cessation of working activity <sup>18,19</sup>. In Spain, people generally retire between 65 and 67  
94 years of age <sup>20</sup>.

95 Despite the volume of research published so far, few studies have evaluated the effect of  
96 lockdown on the physical activity and eating behaviours of the population from the  
97 Autonomous Community of Andalusia, in southern Spain. The aim of our work is,  
98 therefore, to describe the effect of COVID-19 pandemic home lockdown on the dietary

99 habits and lifestyle of the Andalusian population, to prevent any negative impact of  
100 future outbreaks and subsequent lockdown measures.

## 101 **2. Materials and Methods**

### 102 2.1. Study design

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

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### 114 2.2. Population

115 The study population consisted of adults of 18 years of age or above, who used digital  
116 technology. The start of the questionnaire included a brief description of the purpose of  
117 the survey, information about the researchers responsible, and the fact that the data  
118 collected would be both anonymous and confidential. Filling in the questionnaire was  
119 completely voluntary. In addition, the participants were able to leave the study at any  
120 time before submitting the survey. Responses were saved only when the submit button  
121 was clicked. The Ethical Principles established by the World Medical Association  
122 (WMA) in the Declaration of Helsinki were followed in the development of this study.  
123 This study was also in line with current Spanish legislation, the General Data Protection

124 Regulation, and Organic Law 3/2018, of 5 December, on Personal Data Protection and  
125 the guarantee of digital rights.

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### 127 2.3. Data collection

128 The data was collected by means of a structured self-administered questionnaire,  
129 created on the Google Form platform. This questionnaire collected the questions to be  
130 answered sequentially and according to the scenarios "before" and "during" lockdown.

131 It included 34 items and was divided into three main sections, organised as follows: one  
132 section on sociodemographic data; a second section containing questions about general  
133 habits, work and leisure activities; and finally, questions to determine variation in food  
134 consumption. The sociodemographic information collected included the variables age,  
135 sex, educational level, place where the lockdown was taking place, people with whom  
136 the participants were living at that time, information on the home they were confined to,  
137 their employment situation and the need to go out to work, as well as changes in  
138 financial income and body weight. The second section included questions on sleep  
139 habits and physical activity levels. The items referring to eating habits were: eating  
140 schedules and the number of meals/day, snacking between meals, consumption of ultra-  
141 processed food groups, fast food at home, and the consumption of fresh food. Finally,  
142 we included questions aimed at investigating changes in the frequency of food  
143 consumption, with the intention of finding out whether the participants had increased,  
144 decreased, or maintained their habits, for which we presented the foods organised into  
145 rows with 4 possible response options: no consumption, more, less, or the same level.  
146 These foods included beverages such as soft drinks, stimulant drinks, and alcohol.

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### 148 2.4. Data analysis

149 The participants were divided into 3 groups according to their age, a first group of  
150 participants aged between 18 and 35, a second group between 36 and 65, and finally,  
151 those over 65 years of age, according to the classification of the Spain's National  
152 Institute of Statistics <sup>21</sup>. Quantitative variables were analysed using a one-way ANOVA  
153 and qualitative variables were analysed using a Chi-square test, both with a significance  
154 of 0.05. Odds ratios were calculated using binary logistic regression analysis with  
155 dietary assessment (less or the same vs. more) as the dependent variable (confidence  
156 intervals at 95%). The first step included models evaluating the relationship between  
157 each determinant and the assessment of food, less or the same versus more and the  
158 corresponding odds ratio, adjusted for the following variables: modified weight, degree  
159 of physical activity, amount of food, and modified sleep. In the second step, the odds  
160 ratios were adjusted for sex and educational level. The normality of the distributions  
161 was checked using the Kolmogorov-Smirnov test. The significance level was  $p < 0.05$ .  
162 All of the analyses were performed with version 24 of the SPSS software package  
163 (IBM, Armonk, NY, USA).

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### 165 **3. Results**

166 Table 1 shows the sociodemographic characteristics of the participants classified into  
167 three age groups: 18-35, 36-65, and over 65 years of age. A total of 1,140 people  
168 participated, all of whom were of legal age. Highly significant statistical differences  
169 ( $p < 0.001$ ) were found between the three age groups in relation to the number of  
170 cohabitants, leaving the home to go to work, and the reduction of income during  
171 lockdown.

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

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

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

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

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#### 195 **4. Discussion**

196 The global COVID-19 pandemic led to home isolation measures in many parts of the  
197 world. Changes in dietary patterns have been identified as a result of this lockdown, as  
198 well as lifestyle changes that affect sleep and physical activity. As in other studies, our



199 data shows that a small number of people spent the lockdown alone, which is consistent  
200 with other studies <sup>16,22,23</sup>. Age is shown to be a determining factor in the changes  
201 observed; around 50% of those surveyed who are of working age have seen their  
202 income reduced as a result of the shutdown of non-essential activity, as demonstrated by  
203 the National Statistics Institute in Spain <sup>24,25</sup>. With the closure of non-essential activity  
204 and the shift to online education, few people had to leave home to go to their workplace.  
205 This affected the middle-aged population to the greatest extent, as they have more stable  
206 jobs, similarly to that reported in other work <sup>17</sup>.

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

218 On a general level, the participants consumed more food as they had more time, quicker  
219 access to food, and greater stress levels <sup>7,30-32</sup>. To cope with this high demand for  
220 products, all links in the food production chain had to adapt rapidly <sup>4,33</sup>. Related to this  
221 higher level of consumption, is the group of 18-35 year olds who claimed to have  
222 increased the variety in their diets; they are the most irregular in terms of schedule, and  
223 they are the group who showed the greatest increase in the number of meals eaten every

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

238 Around a quarter of the participants increased their consumption of food groups like  
239 cereals, tubers, legumes, meats and cold cuts, as well as dairy products, figures that are  
240 in line with those published in the Smart Agrifood report <sup>33</sup>. This growth was higher in  
241 the 18-35 age group, as reflected in another study conducted on a Polish population <sup>34</sup>.  
242 In addition, almost half of the participants increased their intake of so-called "comfort"  
243 foods (sweets and pastries), just as in other populations studied <sup>30</sup>, and almost a third  
244 increased their consumption of nuts, information that is reflected in the MAPA report <sup>4</sup>.  
245 At the same time, we observed a decrease in the consumption of seafood, especially in  
246 the 36-65 age group, and among the youngest, we detected a more pronounced decrease  
247 in the consumption of precooked foods, stimulant and alcoholic beverages, as well as  
248 cereals and whole-grain products. Although purchases of alcohol and spirits rose

249 slightly, this is far less than the number of beverages purchased for consumption outside  
250 the home in the pre-pandemic period, coinciding with that reported in other studies  
251 <sup>4,39,40</sup>. In our study, the greatest drop in consumption was seen in the 18 to 35 year olds.  
252 This trend change could be explained by the impossibility of having interpersonal  
253 relationships and doing leisure activities outside the home. Overall, these findings are in  
254 line with those described by previous studies <sup>16,17,34,35</sup> which describe decreased alcohol  
255 consumption in the general population.

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

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

274 capacity, insulin resistance, and decreased muscle performance. However, despite the  
275 low expectations, in our study we found that more than two thirds of the respondents  
276 maintained or increased their physical activity, and similar values were found in a study  
277 of an Italian population, where participants who already engaged in sport prior to  
278 lockdown increased the frequency of their training <sup>17</sup>. Additionally, in our study we  
279 found that the increase in physical activity was significantly higher among the younger  
280 age group, coinciding with that described by Pérez-Rodrigo et al. <sup>46</sup> in their study on a  
281 Spanish population, in which they observed greater physical activity levels during  
282 lockdown among participants aged between 18 and 34. Another study, conducted in  
283 northern Italy, concluded that people over 30 years of age were less likely to increase  
284 their physical activity during lockdown <sup>16</sup>.

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

292 The strengths of our study include the online survey, which allowed us to reach a large  
293 number of people quickly, at a time when most of the population could not leave their  
294 homes. In addition, the results are stratified by age group, which provides a clearer  
295 picture of eating behaviour in these populational groups. The limitations of the study  
296 include the non-random sampling technique employed to reach the participants. In  
297 addition, the majority of the participants were women, something which is very

298 common in research conducted during lockdown<sup>23,41</sup>. As this was an online survey, it  
299 was not possible to find out further details related to the participants' answers.

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

#### 312 **Availability of data and materials**

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

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318 **Authors' contributions** C.F.N.-P., E.G.-J. and J.S.-R designed research; C.F.N.-P. and Á.F.-A.  
319 conducted research; C.F.N.-P. provided the database; M.Á.M.-A analyzed data; C.F.N.-P., E.G.-  
320 J. and J.S.-R wrote paper; E.G.-J. had primary responsibility for final content. All authors read  
321 and approved the final manuscript.

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324 **Ethical Approval**

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

329 **Competing interests**

330 The authors declare no conflict of interest.

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506 **Tables**

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

508

| <b>Variables</b>   | <b>18-35 years</b> | <b>36-65 years</b> | <b>&gt;65 years</b> | <b>Total</b> |
|--|--------------------|--------------------|---------------------|--------------|
| <b>Days of lockdown</b> (mean ± SD)  | 39.4±7.10          | 37.7±7.58          | 41.7±5.87           | 38.7±7.35    |
| <b>Sex</b> <sup>1</sup> <i>p</i> =0.311  |                    |                    |                     |              |
| Woman  | 471 (55.8%)        | 362 (42.9%)        | 11 (1.3%)           | 844          |
| Man  | 143 (49.7%)        | 138 (47.9%)        | 7 (2.4%)            | 288          |
| <b>Studies</b> <sup>2</sup> <i>p</i> =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          |
| <b>No. of people living together</b> <i>p</i> <0.001   |                    |                    |                     |              |
| Alone  | 42 (35%)           | 75 (62.5%)         | 3 (2.5%)            | 120          |
| With others  | 578 (56.7%)        | 427 (41.9%)        | 15 (1.5%)           | 1020         |
| <b>House m<sup>2</sup></b> <i>p</i> =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          |
| <b>During lockdown, income has been reduced</b> <sup>3</sup> <i>p</i> <0.001                   |                    |                    |                     |              |
| Yes  | 316 (57.0%)        | 236 (42.6%)        | 2 (0.4%)            | 554          |
| No   | 276 (51.4%)        | 248 (46.2%)        | 13 (2.4%)           | 537          |
| <b>Due to your working situation, do you have to leave home to go to work?</b> <i>p</i> <0.001 |                    |                    |                     |              |
| Yes  | 108 (43.5%)        | 139 (56.0%)        | 1 (0.4%)            | 248          |
| No   | 512 (57.4%)        | 363 (40.7%)        | 17 (1.9%)           | 892          |

509

510 <sup>1</sup>The figures do not coincide because 8 respondents preferred not to answer the sex  
511 question. <sup>2</sup>Higher (diploma, degree, university degree, Master's degree, and doctorate)  
512 and not higher (from primary studies to baccalaureate, including vocational training).

513 <sup>3</sup>The figures do not coincide because there were 49 respondents who preferred not to  
514 answer the income reduction question.

515

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

| <b>Variables</b>  | <b>18-35 years</b> | <b>36-65 years</b> | <b>&gt;65 years</b> | <b>Total</b> |
|---|--------------------|--------------------|---------------------|--------------|
| <b>Weight change</b> $p=0.001$                                |                    |                    |                     |              |
| Yes   | 321 (55.2%)        | 255 (43.9%)        | 5 (0.9%)            | 581          |
| No  | 160 (47.8%)        | 164 (49.0%)        | 11 (3.3%)           | 335          |
| <b>Has your sleep pattern changed?</b> $p<0.001$              |                    |                    |                     |              |
| Yes   | 492 (60.1%)        | 319 (39.0%)        | 7 (0.9%)            | 818          |
| No  | 128 (39.8%)        | 183 (56.8%)        | 11 (3.4%)           | 322          |
| <b>Do you find it more difficult to fall asleep?</b> $p<0.05$ |                    |                    |                     |              |
| Yes   | 409 (58.1%)        | 288 (40.9%)        | 7 (1.0%)            | 704          |
| No  | 211 (49.1%)        | 214 (48.4%)        | 11 (2.5%)           | 436          |
| <b>Assessment of your diet</b> $p<0.001$                      |                    |                    |                     |              |
| 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          |
| <b>Level of physical activity</b> $p<0.001$                   |                    |                    |                     |              |
| 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          |
| <b>Amount of food</b> $p<0.001$                               |                    |                    |                     |              |
| 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          |
| <b>Variety of food</b> $p=0.004$                              |                    |                    |                     |              |
| 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          |
| <b>Regularity of schedules</b> $p<0.001$                      |                    |                    |                     |              |
| 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          |
| <b>Number of meals per day</b> $p<0.001$                      |                    |                    |                     |              |
| 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          |
| <b>Snacking between meals</b> $p<0.001$                       |                    |                    |                     |              |
| 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          |
| <b>Fresh food consumption</b> $p=0.001$                       |                    |                    |                     |              |
| 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          |
| <b>Packaged food consumption</b> $p=0.036$                    |                    |                    |                     |              |
| 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          |
| <b>Fast food consumption at home</b> $p<0.001$                |                    |                    |                     |              |
| 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          |

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

520

|   | 18-35 years | 36-65 years | >65 years | Total |
|---|-------------|-------------|-----------|-------|
| <b>Cereals and derivatives (bread, pasta, rice) <math>p&lt;0.001</math></b>                             |             |             |           |       |
| 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   |
| <b>Cereals and whole-grain derivatives <math>p&lt;0.001</math></b>                                      |             |             |           |       |
| 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   |
| <b>Sweets and pastries (including breakfast cereals, chocolate and biscuits) <math>p&lt;0.05</math></b> |             |             |           |       |
| 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   |
| <b>Fruit juices (including natural) <math>p=0.062</math></b>  |             |             |           |       |
| 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   |
| <b>Vegetables and salad <math>p=0.104</math></b>  |             |             |           |       |
| 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   |
| <b>Potatoes <math>p&lt;0.001</math></b>   |             |             |           |       |
| 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   |
| <b>Pulses <math>p=0.018</math></b>  |             |             |           |       |
| 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   |
| <b>Soft drinks <math>p=0.077</math></b>   |             |             |           |       |
| 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   |
| <b>Stimulant drinks (with caffeine, theine, and ginseng) <math>p&lt;0.05</math></b>                     |             |             |           |       |
| 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   |
| <b>Alcoholic beverages <math>p&lt;0.001</math></b>  |             |             |           |       |
| 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 |
|--|-------------|-------------|-----------|-------|
| <b>Milk and dairy products (yoghurt, cheese) <math>p&lt;0.05</math></b>                              |             |             |           |       |
| 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   |
| <b>Dairy-type beverages (soy, almond, oatmeal) <math>p=0.401</math></b>                              |             |             |           |       |
| 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   |
| <b>Dairy desserts (custard, flan, rice pudding, etc.) <math>p&lt;0.05</math></b>                     |             |             |           |       |
| 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   |
| <b>Fatty meats (pork, beef) <math>p&lt;0.05</math></b>   |             |             |           |       |
| 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   |
| <b>Lean meats (chicken, turkey, rabbit) <math>p&lt;0.05</math></b>                                   |             |             |           |       |
| 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   |
| <b>Sausages and cold cuts <math>p&lt;0.05</math></b>   |             |             |           |       |
| 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   |
| <b>Oily fish (sardines, salmon, tuna, mackerel) <math>p&lt;0.001</math></b>                          |             |             |           |       |
| 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   |
| <b>Lean and semi-fatty fish (hake, cod, monkfish, gilt-head bream, sole) <math>p&lt;0.001</math></b> |             |             |           |       |
| 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   |
| <b>Seafood <math>p&lt;0.001</math></b>   |             |             |           |       |
| 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   |
| <b>Eggs <math>p=0.594</math></b>   |             |             |           |       |
| 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   |

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525

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

|  | <b>18-35 years</b> | <b>36-65 years</b> | <b>&gt;65 years</b> | <b>Total</b> |
|--|--------------------|--------------------|---------------------|--------------|
| <b>Olive oil</b> $p=0.381$   |                    |                    |                     |              |
| 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          |
| <b>Other seed oils (sunflower) and fats (butter or margarine)</b> $p<0.05$ |                    |                    |                     |              |
| 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          |
| <b>Precooked foods</b> $p<0.05$  |                    |                    |                     |              |
| 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          |
| <b>Savoury snacks</b> $p=0.946$  |                    |                    |                     |              |
| 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          |

526

527 **Table 6.** Based on Food Assessment (less or the same vs. more)  
 528

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

529

530 Less or the same were taken as the reference. The data is presented as the odds ratio  
 531 (OR) with 95% confidence intervals (CI) using a logistic regression model. ORa  
 532 adjusted for sex and educational level. \*\*\*p<0.001