

# Eating 'green' and being 'green': A cross-sectional study among Italian adults through Mediterranean diet adherence

FJONA ZENELI , ALESSIA CAVALIERE , LUCIA BALDI\* , ELISA DE MARCHI ,  
ALESSANDRO BANTERLE 

*Department of Environmental Science and Policy, University of Milan, Milan, Italy*

\*Corresponding author: [lucia.baldi@unimi.it](mailto:lucia.baldi@unimi.it)

**Citation:** Zeneli F, Cavaliere A., Baldi L., De Marchi E., Banterle A. (2026): Eating 'green' and being 'green': A cross-sectional study among Italian adults through Mediterranean diet adherence. *Agric. Econ. – Czech*, 72: 302–313.

**Abstract:** This study examines the factors influencing adherence to the Mediterranean diet from a socioeconomic perspective, focusing on Italy as a representative Mediterranean country. The observed decline in adherence to this diet in favour of Western dietary patterns highlights the need for a deeper understanding of the factors influencing this trend. Specifically, the analysis investigates sociodemographic and economic variables that may influence adherence to the Mediterranean diet. On the other hand, it assesses the role of individual characteristics related to environmental concerns and pro-environmental behaviours, considering that the Mediterranean diet is widely recognised not only as a healthy but also a sustainable dietary model. The study utilises secondary data from the Italian National Institute of Statistics, based on a representative sample of 34 151 individuals, employing an ordinal logistic regression model. The findings reveal that sociodemographic factors – such as gender, age, education, economic status, family structure, and region of residence – significantly and positively affect adherence to the Mediterranean diet. Regarding environmental concerns and behaviours, the study finds a strong association between environmental awareness and higher adherence. Therefore, policy interventions and educational campaigns aimed at promoting the Mediterranean diet should adopt a holistic approach that includes the environmental dimension.

**Keywords:** environmental attitude; environmental concerns and behaviours; sustainable diet adherence; ordinal logistic model

The Mediterranean diet (MD) is the traditional eating pattern of the populations living in Mediterranean countries (Keys et al. 1954). It is based on the consumption of local, fresh, seasonal foods, with a strong link with the territory and the culture of the countries

where it is spread. The MD is mainly plant-based, involving daily consumption of fruits, vegetables, legumes, cereals, and olive oil, moderate intake of fish and poultry, and low intake of red meat and processed foods. Over the past two decades, interest in the MD,

---

Supported by ON Foods – Research and Innovation Network on Food and Nutrition Sustainability, Safety and Security – Working ON Foods, funded under the National Recovery and Resilience Plan (NRRP), Mission 4, Component 2, Investment 1.3, by the Italian Ministry of University and Research through the European Union – NextGenerationEU. This work was also formulated within the framework of the MUSA – Multilayered Urban 220 Sustainability Action – project, funded by the European Union – NextGenerationEU, under the 221 National Recovery and Resilience Plan (NRRP) Mission 4 Component 2 Investment Line 1.5: 222 Strengthening of research structures and creation of RandD 'innovation ecosystems', set up of 223 'territorial leaders in RandD'.

© The authors. This work is licensed under a Creative Commons Attribution-NonCommercial 4.0 International (CC BY-NC 4.0).

<https://doi.org/10.17221/77/2024-AGRICECON>

its relationship with health and the environment has grown significantly. It is well known that high adherence to the MD food intake recommendations has preventive effects against several non-communicable diseases (e.g. obesity, cardiovascular disease etc.) and is associated with overall lower all-cause mortality (Dinu et al. 2018).

Beyond its health benefits, the MD has also been identified as a sustainable dietary pattern, able to limit diet-related environmental footprint and resource use, meanwhile promoting biodiversity conservation (Trichopoulou and Vasilopoulou 2000; Dernini et al. 2017).

Despite all these well-acknowledged benefits, adherence to the MD has declined over time, being gradually replaced with westernised dietary patterns where consumption of animal-based and highly processed foods is high (Da Silva et al. 2009; Bach-Faig et al. 2011; FAO and CIHEAM 2015). This is raising serious concerns about both public health and the sustainability of the food systems.

Recent economic and scientific literature stresses the need to find effective solutions to slow the declining trend in MD adherence, with effective policy interventions and strategies aimed at spreading knowledge and increasing awareness regarding the health and sustainability advantages of the MD (Abdullah et al. 2015; Tong et al. 2018).

To this end, it is crucial to identify the key drivers of MD adherence. Previous studies showed that, among several interconnected causes, changes in modern lifestyle, globalisation, and urbanisation have contributed to the progressive abandonment of the MD. Other studies have explored the role of sociodemographic and economic variables, focusing on age, gender, education level, as well as income. However, these findings are not entirely consistent. For instance, some studies reported that older individuals, women, with higher education show greater adherence to MD recommendations, while others showed that age and education do not uniformly predict higher MD adherence (Buckland et al. 2008; Grosso et al. 2013; Kyriacou et al. 2015).

Besides sociodemographic and economic variables, other individual characteristics can affect MD adherence. Among these, environmental concerns (EC) and pro-environmental behaviours (PEB) seem to play a key role. EC consist of the level of individuals' knowledge of environmental issues, support for their efforts to solve those problems and the level of willingness to contribute to their solutions (Štreimikienė et al. 2022), while PEB can be seen as a form of cooperation, a joint effort of individuals for a shared environmental benefit (Klein et al. 2022).

However, evidence in this regard is still limited; this study extends this field of research by analysing the relationship between individual EC and PEB with higher or lower adherence to the MD. The study also considers the role of key sociodemographic and economic variables (age, gender, education, satisfaction with economic status, and region of residence) to ensure a broader understanding of the phenomena underlying different degrees of adherence to the MD food intake recommendations.

By exploring the role of EC and PEB as possible drivers of MD adherence, this study seeks to provide novel insights into how the sustainability dimension can be incorporated into the development of more holistic strategies that encourage MD adherence. The results are expected to provide evidence that helps to redesign food policy interventions that not only appeal to health motives but also tap into environmental motivations to foster long-term dietary shifts based on the MD pattern.

## MATERIAL AND METHODS

**Data.** In this analysis, we used secondary data from the Multipurpose Statistical Survey of Italian Households, conducted yearly by the Italian Institute of Statistics (ISTAT 2021). The survey provides data on 34 151 individuals representative of the Italian population, and includes data on key sociodemographic and economic variables, their food habits, as well as several questions that elicit EC and PEB.

Food consumption habits are elicited through a set of questions on individual consumption frequencies of 15 main food groups of the MD, with answers ranging from 'never' to 'more than once a week'. Additional items elicited the type of fat used for cooking and as a condiment: participants were asked to select from three options: olive oil, other vegetable fats and oils, or butter or lard.

EC and PEB were respectively elicited through two sets of items. The latter were not included in the previous waves of the ISTAT household survey and were recently added in recognition of the increasing attention of the population towards sustainability issues.

**Analytical strategy.** To quantitatively assess MD adherence score (our dependent variable), consumption frequencies were recoded (with values ranging from 0 to 2) based on the recommended food intake of each food group, as indicated in the updated MD pyramid guidelines for the adult population (Dernini and Berry 2015; Cavaliere et al. 2018; Serra-Majem et al. 2020). Score 0 was assigned when the self-reported consumption frequency was not in line with the MD recommendation (i.e. no adherence), and 2 otherwise (high adherence) (Table 1).

<https://doi.org/10.17221/77/2024-AGRICECON>

Table 1. Mediterranean diet (MD) adherence score composition, MD recommended intake and recoding

Food items	Recommended intake	Question choices	Assigned code
Cereals (rice, pasta, bread etc.)	2–4 portions daily	never	0
		less than once a week	0
		several times a week	0
		once a day	1
		more than once a day	2
Leaf vegetables cooked and raw (spinach, salad etc.)	4 portions daily	never	0
		less than once a week	0
		several times a week	0
		once a day	1
		more than once a day	2
Other vegetables (tomatoes, aubergines, peppers, pumpkins, fresh legumes etc.)	4 portions daily	never	0
		less than once a week	0
		several times a week	0
		once a day	1
		more than once a day	2
Fruit	1–2 portions daily	never	0
		less than once a week	0
		several times a week	0
		once a day	1
		more than once a day	2
Legumes	1 portion daily <sup>a</sup>	never	0
		less than once a week	0
		several times a week	1
		once a day	2
		more than once a day	0
Potatoes	≤ 3 portions weekly	never	0
		less than once a week	1
		several times a week	2
		once a day	0
		more than once a day	0
Fish	≥ 2 portions weekly	never	0
		less than once a week	0
		several times a week	2
		once a day	1
		more than once a day	0
Processed meat (salumi)	≤ 1 portions weekly	never	2
		less than once a week	2
		several times a week	0
		once a day	0
		more than once a day	0
Red meat (beef)	< 2 portions weekly	never	1
		less than once a week	2
		several times a week	0
		once a day	0
		more than once a day	0
Sheep meat	< 2 portions weekly	never	1
		less than once a week	2
		several times a week	0
		once a day	0
		more than once a day	0

<https://doi.org/10.17221/77/2024-AGRICECON>

Table 1 To be continued

Food items	Recommended intake	Question choices	Assigned code
Pork meat	< 2 portions weekly	never	1
		less than once a week	2
		several times a week	0
		once a day	0
White meat (turkey, chicken, rabbit, veal, etc.)	2 portions weekly	more than once a day	0
		never	0
		less than once a week	1
		several times a week	2
Eggs	2–4 portions weekly	once a day	0
		more than once a day	0
		never	0
		less than once a week	0
Milk	2 portions daily	several times a week	0
		once a day	1
		more than once a day	2
		never	0
Cheeses	2 portions daily	less than once a week	0
		several times a week	0
		once a day	1
		more than once a day	2
Fat as a condiment	≥ 4 tablespoons daily	olive oil	2
		vegetable oil	1
		animal fat (butter, lard)	0
Fat for cooking	≥ 4 tablespoons daily	olive oil	2
		vegetable oil	1
		animal fat (butter, lard)	0

<sup>a</sup>Recommended intake was ≥ 2 portions weekly

Source: Own codification, following the Mediterranean diet pyramid, with updated intake recommendations from Serra-Majem et al. (2020)

The methods used to calculate MD adherence from frequency data need to be explained to enhance clarity. More points were awarded to each food group when the reported frequency was in line with the target intake, while fewer or zero points were allocated when the intake was excessive or insufficient. Take the fruit category, where respondents could receive thumbs up or thumbs down, depending on how much fruit is recommended to be eaten. Respondents who state that they consumed fruit at least once or more than once a day automatically topped the chart, scoring 2. Those who stated that they consumed fruit several times a week ranked 1, and any statement lower than that ranked 0.

A stark contrast exists for those who reported consuming red meat (recommended < 2 portions per week) 'several times a week' or more, who scored zero. Those who reported consuming it 'never' or 'less than once a week' scored the highest (2). This approach ensures that the scoring system captures deviations in either direction from the MD recommendations, in this case, undersupply and oversupply. Each assignment, which mitigates the creation of the adherence index, is supported by dietary guidelines and previous research. Each assignment is based on previous research, ensuring a clear methodology (Dernini and Berry 2015; Cavaliere et al. 2018; Serra-Majem et al. 2020).

Table 2. Environmental concerns (EC) items

---

Question items:  
Environmental issues that concern you most (max 5 answers)

---

C1: greenhouse effect, ozone hole  
C2: extinction of some animal/plant species  
C3: climate change  
C4: waste production and disposal  
C5: noise  
C6: air pollution  
C7: soil pollution  
C8: pollution of rivers, seas  
C9: hydrogeological instability (earthquakes, floods etc.)  
C10: man-made disasters  
C11: destruction of forests  
C12: electromagnetic pollution  
C13: landscaping (excessive building construction)  
C14: depletion of natural resources (water, minerals, oil etc.)  
C15<sup>a</sup>: other issues

---

<sup>a</sup>C15 was not considered.

Source: Own elaboration based on ISTAT (2021) data

The MD score is then transformed into an ordinal variable following the quartiles of its distribution and resulting in 4 ordered levels of the MD adherence (low, medium-low, medium-high, and high). This approach allowed us to categorise the sample based on MD adherence, thus better detecting differences across groups.

To assess EC and PEB scores, we used two sets of items, respectively, included in the household survey.

As for the EC, we used 14 questions related to various environmental concerns (Table 2). Respondents were asked to select up to 5 EC. Each item was coded as a dummy variable, assuming a value of 1 when the concern was selected and 0 otherwise. To obtain a more reliable EC score, the items were weighted according to how frequently they were selected by respondents. The rationale is that more widely shared concerns can be interpreted as more salient and socially relevant. This logic is consistent with the broader literature on environmental attitudes, which treats the prevalence of an issue in the population as a proxy for its salience (Cruz and Manata 2020). Subsequently, the individual EC scores were calculated as the weighted sum of the selected items.

As for the PEB scores, we used 9 items (Table 3) aimed at eliciting how frequently respondents engage in several PEB. In line with Kaiser et al. (2010), we assumed that not all behaviours equally reflect pro-environmental orientation.

So, the PEB score is calculated as a weighted sum of the reported behaviours, with weights derived from their empirical frequency in the sample. Based on the rationale that some actions require a stronger individual commitment and thus serve as more discriminating indicators of environmental engagement; less frequently reported behaviours were assigned higher weights. This procedure allowed us to capture differences in behavioural intensity while maintaining a transparent and reproducible scoring system. The related question B2: 'Buying organic foods and products' was considered an environmentally friendly practice, despite the mixed literature. Edwards-Jones (2010) and Seufert et al. (2012) are among those who analysed some potential environmental drawbacks of these practices, but since our case study is Italy (i.e. known for the traditional techniques of producing cheese, pasta etc., important food items of the MD pyramid) we assumed that the methods of production are not resource-intensive, therefore, we decided to include it in our analysis. Variables are described in Table S1 in the Electronic Supplementary Material (ESM).

**Ordinal logistic model.** The analysis is based on the ordinal logistic regression model. In our analysis, the dependent variable is the MD adherence resulting from the quartile distribution of the MD score. The covari-

<https://doi.org/10.17221/77/2024-AGRICECON>

Table 3. Pro-environmental behaviours (PEB) items

Question items:
Exhibited behaviours (environmentally friendly and not)
B1 <sup>a</sup> : reading the ingredients on food labels
B2: buying organic foods and products
B3: buying local food and products
B4 <sup>b</sup> : throwing papers on the street
B5: being careful not to waste water
B6: being careful not to waste electricity
B7 <sup>b</sup> : double parking the car
B8: being careful not to adopt noisy driving behaviour
B9: choosing alternative means of transport to the car and/or other private motor vehicles
B10 <sup>b</sup> : using disposable products

<sup>a</sup>B1 was not considered because it does not necessarily reflect pro-environmental behaviour; <sup>b</sup>scores for questions B4, B7, and B10 were reversed

Source: Own elaboration based on ISTAT (2021) data

ates include sociodemographic factors as well as the two indicators of EC and PEB scores. This model allows us to estimate the probability of individuals exhibiting higher levels of adherence to the Mediterranean diet, under the assumption of proportional odds across response categories.

Following Long and Freese (2006), the formalised model is in Equation (1).

where:  $\pi_j(\underline{x}) = \pi(Y \leq j | x_1, x_2, \dots, x_p)$  – the probability, given a set of predictors  $j = 1, 2, \dots, J - 1$ , of being at or below category  $j$ ;  $a_j$  – the cut points (intercepts);  $\beta_1, \beta_2, \dots, \beta_p$  – the coefficients of the logit model. Since there are  $j$  categories, the model provides estimates for  $J - 1$  cut points.

Therefore, our functional model is expressed in Equation (2).

where: *MD* – the MD adherence score at individual level for  $j = 4$  categories, that is the 4 ordered levels of the MD adherence (low, medium-low, medium-high, and high); *Male* – gender that equals 1 for female; *Age* – age categories; *Education* – individual educational attainment; *Economic Situation* – individual perceived adequacy

of the economic resources during the year of study; *Family Status* – the family structure; *Region* – regional differences in MD adherence; *EC* and *PEB* – environmental concerns, and pro-environmental behaviours scores, respectively.

As robustness tests, we run two multiple linear regressions: one including EC and PEB scores, and one including EC and PEB decomposed into groups of similar items (referring to similar environmental issues) (Table S2, ESM). To check for the level of variable association and the presence of multicollinearity, we calculated polyserial correlation coefficients, and the variance inflation factor (VIF) after the multiple regression model, used as a robustness check for our model (it is not possible to directly calculate VIF after the ordinal logistic model) (Tables S3 and S4, ESM).

## RESULTS

Table S5 (ESM) displays the descriptive statistics of our sample. The range of statistics is a confirmation that the sample is highly representative of the Italian

$$\ln(Y'_j) = \text{logit}[\pi(\underline{x})] = \ln\left(\frac{\pi_j(\underline{x})}{1 - \pi_j(\underline{x})}\right) = a_j + (-\beta_1 X_1 - \beta_2 X_2 - \dots - \beta_p X_p) \tag{1}$$

$$\text{logit}(MD'_j) = a_j + (-\beta_1 \text{Male} - \beta_2 \text{Age} - \beta_3 \text{Education} - \beta_4 \text{EconomicSituation} - \beta_5 \text{FamilyStatus} - \beta_6 \text{Region} - \beta_7 \text{EC} - \beta_8 \text{PEB}) \tag{2}$$

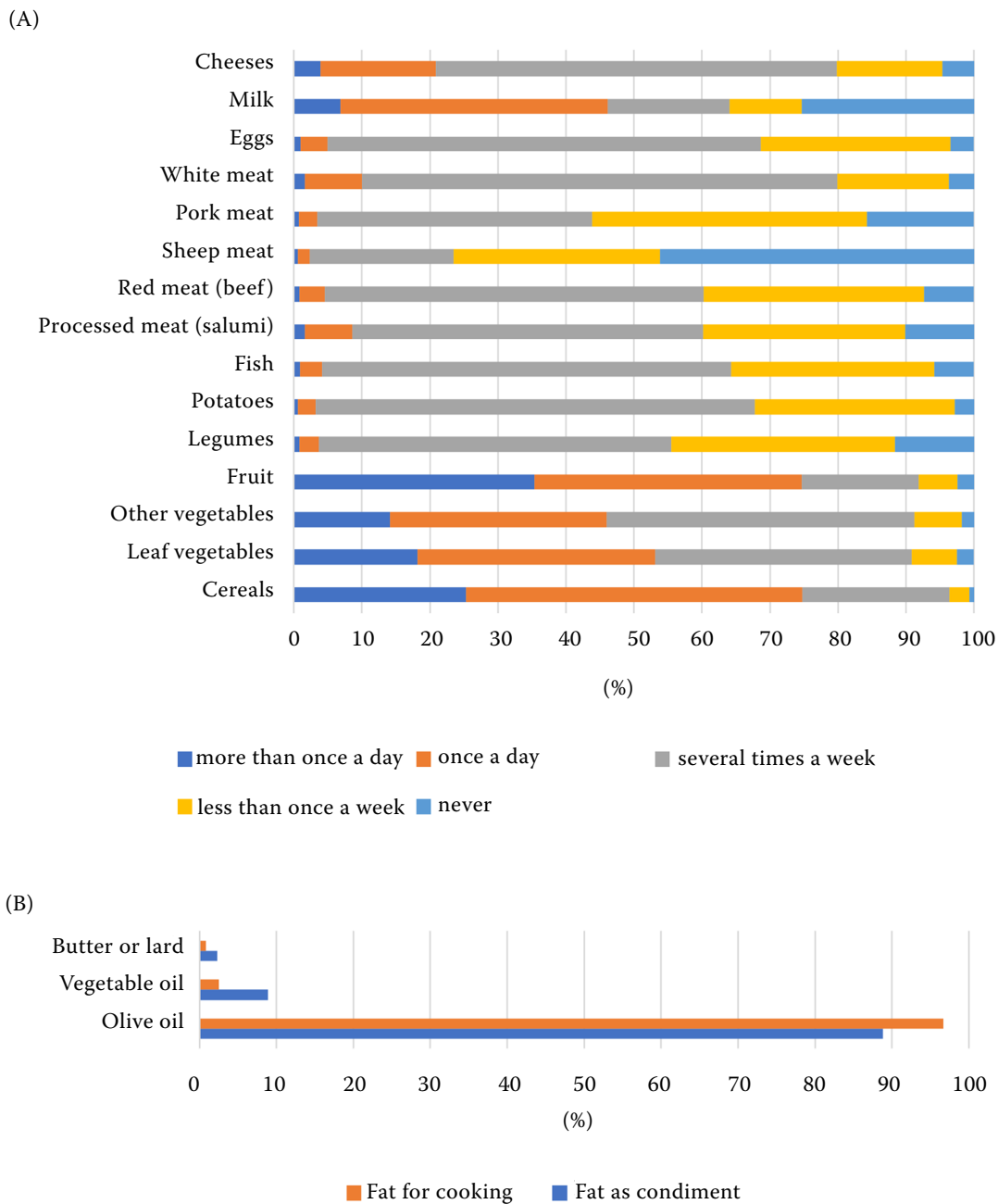


Figure 1. Individual consumption frequency for each item: food categories (1A) and fat sources (1B)

Source: Own elaboration based on ISTAT (2021) data

population. The consumption frequencies for each selected food item are represented in Figure 1.

In Table 4, the results of the ordinal logistic regression model can be consulted. There are calculated both coefficients and odds ratios, revealing the direction and magnitude of the associations between exogenous variables and our variable of interest (i.e. MD adherence levels).

In order to consider for possible influence of sociodemographic factors on both EC and PEB, the correlation coefficients (i.e. polyserial correlation coefficients since the variables are of different types) are displayed in Table S3 (ESM). What can be observed is a weak association of EC and PEB with almost all the sociodemographic factors (i.e. age, gender, income, family, and region). Education stands apart: there is a relatively

<https://doi.org/10.17221/77/2024-AGRICECON>

Table 4. Ordinal logistic regression model results

Variables	Coefficients	Odds ratios
Gender		
male	–	–
female	0.352***	1.422***
Age	0.196***	1.217***
Education level	0.0702***	1.072***
Economic situation	0.123***	1.131***
Family type		
alone	–	–
couple with children	0.005	1.005
couple without children	0.107***	1.11***
single father	–0.131*	0.876*
single mother	–0.0279	0.972
Region		
South	–	–
Central	0.068**	1.070**
North	–0.131***	0.877***
Environmental concerns	0.042***	1.043***
Pro-environmental behaviours	0.248***	1.281***
/cut 1		2.569
/cut 2		3.881
/cut 3		4.775
LR chi <sup>2</sup>		2 534.51***
Model fit		0.027 1
Observations		34 151

\*\*\*, \*\* and \*significance levels at 0.01, 0.05 and 0.1, respectively

Source: Own elaboration based on ISTAT (2021) data

stronger link to EC and PEB, respectively, 0.19 and 0.28, both significant at 1%. These results give us affirmation of no serious endogeneity bias. Moreover, there is a moderate positive association coefficient between EC and PEB (0.24), reflecting a real association more than a spurious correlation.

Additionally, a multicollinearity test is performed. The results are displayed in Table S4 (ESM). The variance inflation factor (VIF) values are less than 2.5, affirming the lack of significant multicollinearity in the model.

What emerged from the results helps create the average Italian citizen profile in terms of MD adherence, in line with the findings of the existing literature (Trichopoulou et al. 2003; Marques-Vidal et al. 2015; Martinez-Lacoba et al. 2018; Ruggiero et al. 2019). Sociodemographic factors such as gender, age, education, income, family type, and geographical region all resulted in statistically significant, confirming their role in modelling the individuals' dietary behaviours.

What is obvious and important to distinguish is that PEB emerges as a particularly strong positive predictor, proving empirically the increasing evidence of an association between sustainable lifestyles and healthy diets (McKeown and Dunn 2021).

To add depth to the results, marginal effects (calculated using the delta-method standard errors) were estimated. These marginal effects shed light on the possible differences in MD adherence across different demographic groups. The results are summarised in Table 5.

What emerged from the findings, females are significantly less likely to show low MD adherence, and more likely to affirm high adherence (i.e. respectively, –6.8% and +6.1%) compared to males. This supports the already documented gender gap in health-related behaviours, reflecting that women have a higher likelihood of choosing and adopting more sustainable and healthier nutritional regimes.

Table 5. The average marginal effects for each variable

	Mediterranean diet adherence			
	low	medium-low	medium-high	high
Gender				
male	–	–	–	–
female	–0.068***	–0.014***	0.020***	0.061***
Age	–0.038***	–0.008***	0.011***	0.034***
Education level	–0.014***	–0.003***	0.004***	0.012***
Economic situation	–0.024***	–0.005***	0.007***	0.022***
Family type				
alone	–	–	–	–
couple with children	–0.001	0.000	0.000	0.001
couple without children	–0.020***	–0.005***	0.006***	0.019***
single father	0.026	0.004*	–0.008	–0.022
single mother	0.005	0.001	–0.002	–0.005
Region				
South	–	–	–	–
Central	–0.013*	–0.003*	0.004*	0.012*
North	0.025***	0.005***	–0.007***	–0.023***
Environmental concerns	–0.008***	–0.002***	0.002***	0.007***
Pro-environmental behaviours	–0.048***	–0.010***	0.014***	0.043***

\*\*\* and \*significance levels at 0.01 and 0.1, respectively

Source: Own elaboration based on ISTAT (2021) data

The age resulted strongly significant and high impact on MD adherence levels. The older individuals are more likely to have a high level of adherence and less likely to have low adherence (respectively +3.4% and –3.8%). This finding shows that older individuals have higher health consciousness and higher cultural dietary traditions compared to younger generations.

In the same direction with age, educational background seems to improve the dietary behaviour, reducing the likelihood of low adherence by –1.4% and increasing it of high adherence by +1.2%, compared to less educated people. This affirms that education is a very influential dietary behaviour, providing an increased nutritional awareness and motivating the choice of healthier food options.

The role of economic situation was empirically confirmed: having higher economic resources increases access to fresh, rich in variety and nutritional foods, which are positioned central in the MD pyramid. It resulted that an individual with better economic status and resources is less likely to report low adherence, and more likely to show high adherence, compared with individuals with less economic resources (i.e. respectively, –2.4% and +2.2%).

The structure and composition of the family emerged as significant in shaping the individuals' dietary habits. It resulted that, compared to individuals living alone, couples are more likely to adhere to MD. More specifically, couples without children are more likely to adhere higher to MD (+1.9%) and less likely to adhere lower to MD (–2.0%). In contrast, the single father family type is more likely to have low adherence (+2.6%) and less likely for high MD adherence (–2.2%), even though statistically insignificant. This finding is quite expected, due to factors such as food preparation knowledge, limited time, caregiving responsibilities, etc. Also, couples with children and single mothers show no statistically significant differences.

The living residence also emerged as significant for shaping dietary patterns: Central regions are slightly more likely to report high adherence (+1.2%), while North is more likely to register low adherence (+2.5%) and less likely to reach high adherence (–2.3%). These results reflect the differences, persistent in time, among regions in Italy in terms of MD adherence levels. Southern Italy seems to preserve the traditional Mediterranean dietary practices, despite the globalisation effect and demographic dynamics.

<https://doi.org/10.17221/77/2024-AGRICECON>

Lastly, consulting the effects of environmental factors, the EC specifically, has a low probability for low MD adherence (−0.8%), and a modest likelihood for a high adherence (+0.7%). Despite this factor being statistically significant, the amplitude of its effect tells us that, alone, the EC may not be sufficient to influence dietary choices (they need to be translated into real actions and behaviours changes). In fact, the PEB demonstrates a much stronger effect: a −4.8% decrease in the likelihood of low adherence and a +4.3% increase for high MD adherence. Specifically, this empirical result confirms that exhibiting, at an individual level, environmentally responsible actions is a robust driver of dietary quality. Healthy eating habits seem to be interconnected with a sustainable lifestyle.

## DISCUSSION

To our knowledge, this is one of the first large-scale studies to use a nationally representative dataset to explore how environmental concerns, behaviours, and sociodemographic factors contribute to people's adherence to the MD. This research looks at how well people follow the MD while considering features like age, income, education, and attitudes towards the environment. While earlier research has emphasised the importance of factors such as age, gender, income, and education in shaping dietary habits (Marques-Vidal et al. 2015; Martinez-Lacoba et al. 2018; Ruggiero et al. 2019), our findings show that environmental attitudes and actions are also important when it comes to sticking to the MD.

Importantly, this analysis reveals that more positive health and sustainability behaviours lie more within certain social groups, as opposed to being randomly scattered throughout the population. Women who practice pro-environmental behaviours tend to be older and are more educated, as well as financially and healthily better off. This 'lifestyle consistency', as described by Thøgersen and Ölander (2002) and McKeeown and Dunn (2021), suggests that one's beliefs and behaviours in one domain (e.g. 'pro') ascend other domains, in this case, the diet domain. The dominance of PEB is, however, particularly salient. The engagement in some concrete, tangible, sustainable practices emerges as the better predictor of dietary quality than the other predictor, which is EC predicts weakly. This means that the strengths of the behaviours, which are health and environment related to each other, are more action than orientation. The evidence presented here is in support of the spillover theory: behaviours in different domains are not independent and can positively

reinforce each other to sustain positive feedback loops of sustainable practices.

Such insights serve practical purposes. The differences are tied to the overall inability to adopt sustainable lifestyles. Targeted policies may be needed to ensure that aids to sustainable and healthy eating may be accessible to the disadvantaged, such as the younger population and single parent families. Younger people, especially, who are more aware of the environment but are less compliant with the MD, may find nutrition education and public health campaigns that integrate environmental advocacy more appealing. This is yet another contribution to the ongoing discourse about the MD as having a healthy and environmentally sustainable diet. Focusing on the sociodemographic factors, EC, and PEB, we advocate that dietary modification policies should be multidimensional enough to embrace the culture, economy, and environment of eating.

## CONCLUSION

The research looks at the socio-economic shifts explaining the drivers towards the adoption of the MD and dividing them into two domains. One looks at the sociodemographic and economic factors that support MD adoption, while the other looks at EC and PEB, while MD is viewed as a healthy and sustainable diet. Regarding sociodemographic characteristics, the findings of the research support a consensus that these factors play a prominent role in the adoption of the MD. Educational attainment is one of the most crucial factors and shows the compelling need for greater multi-layered and coordinated public policies that raise nutritional standards. On this note, policy action and education in these areas should be less concerned with the health aspects of the MD and more so with the cultural significance of the diet and its integration with local produce and local economies. This may enhance the MD consumer image and foster a greater interest in the traditional diet in the Mediterranean countries.

The findings also highlight that personal EC and PEB contribute to MD adherence and posit that there is a nexus between personal concern for the environment and dietary behaviour. Specifically, the findings indicate that with increasing EC and PEB, the level of MD adherence also increases (i.e. those who are more concerned with sustainability are more likely to adopt a more sustainable, plant-rich, and environmentally friendly diet such as the MD). Thus, policy and educational initiatives to encourage MD adoption should be interdisciplinary and include all aspects of ecology.

<https://doi.org/10.17221/77/2024-AGRICECON>

The eco-sustainable aspects of the MD should be widely recognised to encourage its adoption. This is particularly important for the younger generation, who, despite being the most enthusiastic about sustainability, practice the least adherence to the MD and are concerned about the environmental aspects of diet. Initiatives that strengthen food labels to emphasise the food's environmental impact can further empower consumers to practice sustainable dietary choices.

The cross-sectional nature of the data used in the study is perhaps the most fundamental limitation of the research. Cross-sectional data do not log changes in MD adherence over time. This limitation is the focus of current research, which aims to trace the changes in dietary patterns using panel data and longitudinal approaches. This research focuses on the sociodemographic and socioeconomic factors, and the latter, alongside the contextual factors, that determine the drivers of adherence to the MD. The results of the research affirm that the standard parameters of age, sex, level of education, and income still hold substantial weight. However, the addition of EC and PEB to one's dietary practices is of greater interest. More importantly, education and a greater level of participation in pro-environmental activities emerged as the strongest positive predictors of MD adherence.

This suggests that the policies surrounding the MD and its impact should include the practice of nutritional advocacy and its practice advocacy on its nutrition ecological significance. Arguments support the MD's conservation's cultural aspects and cultural importance of the MD on feeding the younger population whose love for the earth MD's practice do not defend MD's practice do the MD. More stringent eco-labels on food products could also benefit ecological literacy and empowerment, and sustainable food choice More eco-labels on food products could also benefit ecological literacy and empowerment and advocacy for sustainable food choice.

## REFERENCES

- Abdullah M.M.H., Jones J.P.H., Jones P.J.H. (2015): Economic benefits of the Mediterranean-style diet consumption in Canada and the United States. *Food & Nutrition Research*, 59: 27541.
- Bach-Faig A., Berry E.M., Lairon D., Reguant J., Trichopoulos A., Dernini S., Medina F.X., Battino M., Belahsen R., Miranda G., Serra-Majem L. (2011): Mediterranean diet pyramid today. Science and cultural updates. *Public Health Nutrition*, 14: 2274–2284.
- Buckland G., Bach A., Serra-Majem L. (2008): Obesity and the Mediterranean diet: A systematic review of observational and intervention studies. *Obesity Reviews*, 9: 582–593.
- Cavaliere A., De Marchi E., Banterle A. (2018): Exploring the adherence to the Mediterranean diet and its relationship with individual lifestyle: The role of healthy behaviors, pro-environmental behaviors, income, and education. *Nutrients*, 10: 141.
- Cruz S.M., Manata B. (2020): Measurement of environmental concern: A review and analysis. *Frontiers in Psychology*, 11: 363.
- Da Silva R., Bach-Faig A., Raidó Quintana B., Buckland G., Vaz De Almeida M.D., Serra-Majem L. (2009): Worldwide variation of adherence to the Mediterranean diet, in 1961–1965 and 2000–2003. *Public Health Nutrition*, 12: 1676–1684.
- Dernini S., Berry E.M. (2015): Mediterranean diet: From a healthy diet to a sustainable dietary pattern. *Frontiers in Nutrition*, 2: 15.
- Dernini S., Berry E.M., Serra-Majem L., La Vecchia C., Capone R., Medina F.X., Aranceta-Bartrina J., Belahsen R., Burlingame B., Calabrese G., Corella D., Donini L.M., Lairon D., Meybeck A., Pekcan A.G., Piscopo S., Yngve A., Trichopoulos A. (2017): Med Diet 4.0: The Mediterranean diet with four sustainable benefits. *Public Health Nutrition*, 20: 1322–1330.
- Dinu M., Pagliai G., Casini A., Sofi F. (2018): Mediterranean diet and multiple health outcomes: An umbrella review of meta-analyses of observational studies and randomised trials. *European Journal of Clinical Nutrition*, 72: 30–43.
- Edwards-Jones G. (2010): Does eating local food reduce the environmental impact of food production and enhance consumer health? *Proceedings of the Nutrition Society*, 69: 582–591.
- FAO, CIHEAM (2015): *Mediterranean Food Consumption Patterns: Diet, Environment, Society, Economy and Health*. Rome, FAO; Bari, CIHEAM. Available at <https://openknowledge.fao.org/server/api/core/bitstreams/ea291e6e-deb4-4402-8f1a-138c32d23dbb/content> (accessed April 20, 2025).
- Grosso G., Marventano S., Buscemi S., Scuderi A., Matalone M., Platania A., Giorgianni G., Rametta S., Nolfo F., Galvano F., Mistretta A. (2013): Factors associated with adherence to the Mediterranean diet among adolescents living in Sicily, Southern Italy. *Nutrients*, 5: 4908–4923.
- ISTAT (2021): *Multipurpose Statistical Survey of Italian Households (micro data)*. Available at <https://www.istat.it/en/> (accessed March 15, 2023).
- Kaiser F.G., Byrka K., Hartig T. (2010): Reviving Campbell's paradigm for attitude research. *Personality and Social Psychology Review*, 14: 351–367.
- Keys A., Fidanza F., Scardi V., Bergami G., Keys M.H., di Lorenzo F. (1954): Studies on serum cholesterol and other

<https://doi.org/10.17221/77/2024-AGRICECON>

- characteristics of clinically healthy men in Naples. *A.M.A. Archives of Internal Medicine*, 93: 328–336.
- Klein A.S., Nockur L., Reese G. (2022): Prosociality from the perspective of environmental psychology. *Current Opinion in Psychology*, 44: 182–187.
- Kyriacou A., Evans J.M.M., Economides N., Kyriacou A. (2015): Adherence to the Mediterranean diet by the Greek and Cypriot population: A systematic review. *The European Journal of Public Health*, 25: 1012–1018.
- Long J.S., Freese J. (2006): *Regression Models for Categorical Dependent Variables Using Stata*. 2<sup>nd</sup> Ed. Texas, Stata Press: 589.
- Marques-Vidal P., Waeber G., Vollenweider P., Bochud M., Stringhini S., Guessous I. (2015): Sociodemographic and behavioural determinants of a healthy diet in Switzerland. *Annals of Nutrition and Metabolism*, 67: 87–95.
- Martinez-Lacoba R., Pardo-Garcia I., Amo-Saus E., Escribano-Sotos F. (2018): Mediterranean diet and health outcomes: A systematic meta-review. *European Journal of Public Health*, 28: 955–961.
- McKeown P., Dunn R.A. (2021): A 'life-style choice' or a philosophical belief?: The argument for veganism and vegetarianism to be a protected philosophical belief and the position in England and Wales. *Liverpool Law Review*, 42: 207–241.
- Ruggiero E., Di Castelnuovo A., Costanzo S., Persichillo M., Bracone F., Cerletti C., Donati M.B., de Gaetano G., Iacoviello L., Bonaccio M. (2019): Socioeconomic and psychosocial determinants of adherence to the Mediterranean diet in a general adult Italian population. *European Journal of Public Health*, 29: 328–335.
- Serra-Majem L., Tomaino L., Dernini S., Berry E.M., Lairon D., Ngo De La Cruz J., Bach-Faig A., Donini L.M., Medina F.-X., Belahsen R., Piscopo S., Capone R., Aranceta-Bartrina J., La Vecchia C., Trichopoulou A. (2020): Updating the Mediterranean diet pyramid towards sustainability: Focus on environmental concerns. *International Journal of Environmental Research and Public Health*, 17: 8758.
- Seufert V., Ramankutty N., Foley J.A. (2012): Comparing the yields of organic and conventional agriculture. *Nature*, 485: 229–232.
- Štreimikienė D., Lekavičius V., Stankūnienė G., Pažėraitė A. (2022): Renewable energy acceptance by households: Evidence from Lithuania. *Sustainability*, 14: 8370.
- Tong T.Y.N., Imamura E., Monsivais P., Brage S., Griffin S.J., Wareham N.J., Forouhi N.G. (2018): Dietary cost associated with adherence to the Mediterranean diet, and its variation by socio-economic factors in the UK Fenland Study. *British Journal of Nutrition*, 119: 685–694.
- Thøgersen J., Ölander F. (2002): Human values and the emergence of a sustainable consumption pattern: A panel study. *Journal of Economic Psychology*, 23: 605–630.
- Trichopoulou A., Vasilopoulou E. (2000): Mediterranean diet and longevity. *British Journal Of Nutrition*, 84: S205–S209.
- Trichopoulou A., Costacou T., Bamia C., Trichopoulos D. (2003): Adherence to a Mediterranean diet and survival in a Greek population. *The New England Journal of Medicine*, 348: 2599–2608.

Received: February 27, 2024

Accepted: December 9, 2025