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Understanding the Impact of Agroecological Products: The Algerian Case Study †

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Abstract

Agroecology is a long-term solution for changing agri-food systems as climate change and food security problems become worse. In North Africa, especially Algeria, this change needs a profound understanding of how people feel and act toward food that is grown in an environmentally friendly way. This study looks at what Algerian consumers know, how much they are ready to pay (WTP), and how their social and demographic factors affect their attitudes toward agroecological products and practices. A principal component analysis (PCA) and multiple linear regression have been used on 552 responses from a nationally representative sample collected as part of the NATAE Horizon Europe project to find the psychological and structural factors that affect sustainable consumption. The results show that age, education, job level, and living in a city have a big effect on how aware and open-minded consumers are. People over 45 who have more education and a better job are more likely to care about the environment and be willing to spend more on eco-friendly products, notably, olive oil, fruits, and vegetables. People still do not know much about it, though, and WTP differs by product category. This case study shows how important it is to have targeted education and labelling regulations to fill in knowledge gaps and get people more involved in agroecological changes in Algeria.

Keywords: agroecology; environmental awareness; consumer behaviour; principal component analysis; Algeria

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1. Introduction

Similarly to much of North Africa, Algeria suffers from significant environmental issues, is dependent upon food imports, and is susceptible to climate change [1]. Agroecology is an overall remedy that brings ecological concepts together with farming practices and food systems [2]. While there is knowledge about production-focused techniques, there is less knowledge about consumer dynamics, particularly their awareness, motivations, and economic practices when purchasing food produced using an agroecological approach.

Previous studies on agroecology show that consumers are shifting towards food products that are sustainable, ethically made, and healthy [3–6]. Moreover, consumers are increasingly turning away from conventional products and toward organic or sustainable products, which they associate with higher nutritional value, a lower environmental impact, and high ethical production standards [7]. These changing preferences reflect not only the personal values of consumers but they also show a larger push for food systems that produce sustainable ecological and social outcomes.

The literature review on AE identified four broad thematic clusters in the literature:

a. Consumer behaviour and decision-making process emphasise WTP, food preferences, and sociopsychological variables like educational level, income, and the perceived value of the product [8–10].
b. Sustainability and environmental concerns highlight the connection between food choices and issues like climate change, biodiversity, and carbon footprint [11–15].
c. Health and environmental responsibility emphasise the interaction between health motivations and packaging perceptions in environmentally friendly consumption [5,6,16,17].
d. Ethical consumption with regard to responsible consumption, animal welfare, food security, the fight against food waste, and nutrition in the context of the ethics of consumer choice [3,18–20].

Despite increasing consumer demand for sustainable food, the review also identifies key challenges to the broader uptake of AE products regarding the knowledge of availability, higher prices, and the low public awareness of AE nutritional and environmental benefits [21,22]. The nutritional value of AEP, higher micronutrient content, lower chemical residues, and increased dietary diversity are important factors which have an impact on consumer behaviour [23,24]. The number of peer-reviewed articles that cited AEP was very small, suggesting a gap in terminology and awareness even within the academic literature.

In addition, a lot of previous studies indicated that demographic factors such as consumers age, gender, and education have an important impact on food choices with regard to sustainability [25–27]. Purchasers who are younger and more educated tend to express a higher preference for ethical and environmentally friendly products. Marketing effectiveness and eco-labelling also help to build confidence in consumers and, at the same time, influence purchase decisions [28–30].

The current study is a component of the Horizon Europe NATAE project and aims at filling one such significant gap in information through an analysis of what Algerian consumers know about, and how much they are willing to pay (WTP) for, agroecological products. This research employed real-world observations from the Algerian Living Lab to determine how social and demographic variables influence what people desire and to derive useful findings for policy-making and expanding the market.

2. Materials and Methods

To design the appropriate questionnaire that helped to outline all the factors that influence North African consumers regarding the purchase and consumption of organic foods, the following models were used:

(a) The Theory of Planned Behaviour (TPB), proposed by Ajzen (1991), which serves as one of the most widely used models for understanding and predicting human behaviour, mainly for understanding the consumer decision-making process [31]. Based on this theory, a consumer's behaviour is directly influenced by their intentions, which in turn are shaped by their attitude towards a particular behaviour, subjective norms, and perceived behavioural control.

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(b) The model of Responsible Environmental Behaviour (REB) is based on the fact that both the cognitive (rational) and emotional reactions of consumers play a very important role in consumer behaviour [32].
(c) The Stimulus–Organism–Response (S-O-R) model attempts to examine all stimuli that come from both the external and internal environment of consumers and strongly influence their final consumer decision [33].

The integration of TPB, REB, and S-O-R models was operationalised straight through questionnaire formulation and statistical analysis. Items were borrowed from the TPB framework for assessing attitudes toward the purchase of AE products (e.g., "Buying agroecological products benefits my health"), subjective norms (e.g., "People who are important to me believe I should purchase these products"), and perceived behavioural control (e.g., "I can readily find agroecological products where I shop"). The REB model was operationalised through items assessing environmental knowledge (e.g., familiarity with agroecological practices), affective attachment toward the environment (e.g., worry regarding climate change), and self-reported environmentally friendly behaviours (e.g., recycling, preference for regional cuisine).

The questionnaire was structured into four principal thematic parts: (i) socio-demographics; (ii) awareness and attitudes toward agroecological products; (iii) responsible consumption and environmentally related attitudes; and (iv) WTP for the main food categories produced in the region. Product-specific questions were structured for olive oil, fruit and vegetables, cereals, dairy products, and medicinal plants, since these were important within the diets and markets of Algeria. Dimensions were measured principally through the use of the five-point Likert scale, enabling subsequent data analysis. This framework enabled an overall examination of attitudes toward sustainable diets and an extended examination of consumers' attitudes toward sustainable and agroecological food products.

Principal component analysis (PCA) was used to group the variables into factors in order to obtain the most basic reasons that influence consumers in the AE product market. This analysis was used for the questions of the second, third, and fourth units of the questionnaire to correlate the most relevant variables between them. To identify the factors influencing consumers' WTP for AE products, multiple linear regression analysis was also conducted with the samples' demographic data. The quality and explanatory power of the regression model were assessed using R-squared, adjusted R-squared, and the significance of individual coefficients (p-values) [34].

3. Results and Discussion

The Algerian dataset collected a total of 552 valid responses from a nationally representative diverse sample (online questionnaires with the use of the Limesurvey software and face-to-face interviews). The sample comprised 49.3% male and 50.7% female respondents. Respondents were mainly between 25 and 44 years old (48.8%), working (58.7%), and fairly well educated. Urban residents accounted for almost half of respondents (48.7%), then rural (31%), followed by peri-urban (20.3%) residents. Nevertheless, over half of respondents were dissatisfied with their earnings, which may impact sustainable consumption habits.

The PCA results observed for the Algerian sample, as such, undermine interesting highlights on the various aspects of consumers regarding environmental and agroecological dimensions. However, given the diverse nature of psychological, behavioural, and informational determinants of sustainable consumption, these components serve as evidence of the multicollinearity of attitudes in this scenario in the extraction of 9 indications (Table 1). The stability of the first three components (awareness of agroecological practices,

environmental concern, and trade-off between economic development and environmental protection) indicates that these are the most reliable and significant dimensions in shaping consumer-oriented sustainability behaviour in the context of Algeria.

Table 1. PCA results.

	Principal Components	% of Variance
1	Consumer awareness about AE practices	12.423
2	Environmental concerns	10.547
3	Trade-off between economic development and environmental protection	7.007
4	Consumer perspectives on environment's future	6.798
5	Consumer contribution towards environmental protection	6.064
6	Consumer behaviour towards locally produced food	4.900
7	Consumer environmentally responsible behaviour towards environment	4.391
8	Actions related to environmental awareness	4.109
9	Environmental issue awareness	3.325
	Total % of variance	59.562

The strongest predictor was education, which impacted nearly all elements, particularly AE practice awareness ($p < 0.05$) and environmental concern ($p < 0.001$). Professional status and urban living largely influenced environmental awareness and WTP, presumably because these respective factors offer access to information and green markets. Age was positively associated with personal responsibility and awareness; higher levels of involvement were observed among older consumers. Household composition and gender were associated with certain activities like recycling or choice in favour of locally grown foods (Table 2).

Table 2. Correlation among PCA results and SE characteristics of the Algerian sample.

	Components								
Socio-Economic Characteristics	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Age	***					***	*		
Gender						*			
Professional status	**	***					**		
Average monthly income								*	
Number of adult household members			*					*	
Number of children in household									**
Your household lives in:	***	**	*				*		
Educational level	*	***				*	*	***	

p-value: * < 0.05, ** < 0.01, *** < 0.0001.

One notable finding was that Algerian consumers were generally willing to pay more for agroecological products, especially fruit, vegetables, and olive oil, for which many would pay up to 20% more. Consumers were willing to pay less for items like medical plants and grains, maybe because they were not as familiar with them or thought they did not bring as much value.

Education was the biggest predictor of WTP, followed by the level of satisfaction with income when it came to buying quality meat and dairy products. Age and work status were also significant. Younger customers were less likely to pay extra, although bigger households had different purchasing patterns for different products.

4. Conclusions

The present case study highlighted the main components influencing Algerian consumers towards AE products, explaining 59.56% of the total variance. These elements mainly reflected environmental awareness, knowledge of AE products, and support for locally produced foods. Organic awareness and environmental concern had the greatest influence. Age, educational level, occupation, and place of residence are the most important demographic factors influencing these components. Older people with a high educational level and higher professional status show greater awareness for AE foods. Specifically, consumers over 45 years of age, especially those who are retired or live in urban areas, showed the strongest relationship with awareness of AE. Also, demographics play an important role in consumers' WTP. Education level was the most consistent demographic factor that statistically significantly affected almost all product categories. WTP for AE olive oil (R^2 = 0.089), organic fruits (R^2 = 0.112), and locally produced vegetables (R^2 = 0.073) were strongly influenced by education. In addition, factors such as employment status, household composition, and income satisfaction were statistically significant for some products, such as dairy and meat. However, consumer awareness of sustainable foods remains limited among the general Algerian population, with over 50% of them not being sure whether they are aware of them.

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Abbreviations

The following abbreviations are used in this manuscript:

AE	Agroecology
AEP	Agroecological Practices
WTP	Willingness To Pay
PCA	Principal Component Analysis
SOR	Stimulus–Organism–Response

TPB	Theory of Planned Behaviour
REB	Responsible Environmental Behaviour

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