



Factors Determining where to Buy Olive Oil on the Tunisian Local Market: The Importance of Quality Attributes Perception

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Abstract

The aim of this paper is to investigate the extent to which factors determining the purchase of olive oil within Tunisian consumers also determine their choice of its place of purchase. Based on an exploratory survey carried out with Tunisian household heads, an exploratory factor analysis was conducted to determine the principal dimensions of quality attributes and indicators. To evaluate factor determining olive oil purchase decision and its place of purchase choice, a binomial and a multinomial logistic regressions are respectively used. Consumer sensibility to brand and price have a negative impact on buying decision and on the choice of mills, relatives, and store retail, as suppliers of olive oil. Originating from a production area encourage consumers to buy olive oil from friends and relatives. Tunisian olive oil industry is therefore able to adopt product and distribution policies based on consumer expectations, to improve local market consumption.

Keywords: Logistic regression, Olive oil purchase, Place of purchase, Quality attributes, Indicators.

JEL Classification: E21; M31; Q13.

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Contribution of this paper to the literature

Several works explore the effect of olive oil quality attributes on the purchase decision without any focus on their role in the choice of its place of purchase. This paper investigates how these olive oil quality attributes also determine the choice of its favorite sales points.

1. Introduction

The olive crop is deeply rooted in the traditions of Tunisia, both in terms of production and consumption. The consumption of edible oil in Tunisia is about 22 kg/capita/year and remains dominated by vegetable oil (soya, colza and corn oils). The domestic consumption of Tunisian olive oil is based on family reserves, the direct supply of olive mills or the use of informal circuits. It is difficult to provide a precise estimate of olive oil consumption due to variability in practices and in the channels for sale and purchase. In fact, domestic consumption is not only varying from 20.000 to 60.000 tons/year, but also decreasing. While the olive oil consumption in most of the big consumer countries is improved, it decreases in Tunisia from 6 kg/capita/year before 2000 to approximately 3.5-4 kg/capita/year in 2015. This Tunisian consumption is very lower than the average in the producing countries (20 kg/capita/year in Greece; 12 kg/capita/year in Spain and Italy) [1, 2].

This low and declining consumption was due to the marginal actions to promote olive oil trade and consumption in the local market. Indeed, the promotion is focused on the overseas markets. Furthermore, the Government set the price of the other vegetable oils (soybean oil), enhance local refining, packaging and trade of vegetable oils such as sunflower and maize oils on the domestic market while leaving the price of the olive oil free to reach five times the price of the other vegetable's oils. This politics to book the Tunisian olive oil to the export and to encourage the consumption of the other subsidized vegetables oils on the local market. So, Tunisia was the third olive oil exporter in the world, behind Italy and Spain. The part of the olive oil domestic consumption in the Tunisian olive oil production is about 20%, against 150 % in Italy, 70 % in Greece and 40 % in Spain [1]. Furthermore, in the local market, consumers traditionally buy olive oil in bulk and directly from neighbouring olive oil processing units. Small quantities are retailed in bottles at supermarkets and hypermarkets located especially in large cities [3].

Tunisian producers have realized that to improve market share in a global market, they need also to improve local market consumption and meet consumers' requirements and perceptions. It is becoming evident for the Tunisian olive oil industry to adopt a business strategy based on client preferences, so the objective of this paper is to investigate olive oil consumers' behaviours and to propose a series of business strategies. Therefore, the aims of the present study are:

- To explore the behaviour of Tunisian olive oil consumers toward olive oil.
- To define the way Tunisian consumers, perceive the quality attributes and indicators of olive oil, as factor influencing consumer behaviour.
- And to discover if factors determining the purchase of olive oil also determine the choice of its place of purchase for Tunisian consumers.

2. Literature Review

2.1. Consumers' Perception of Olive Oil Quality Indicators and their Purchase Behaviour

Both endogenous factors (needs and motives, learning, self-concept, personalities, and attitudes) and exogenous factors (culture, reference group, family, and socio-economic situations) affect consumers' buying behaviour [4, 5]. With reference to olive oil consumption, Vlontzos and Duquenne [5]; Van Waterschoot, et al. [6] demonstrate the impact of socio-economic and spatial attributes of consumers households on their olive oil purchase and on the supply modes choices. Also, products attributes like, product quality, price, place of sale and country of origin, affect the consumer's attitude and food purchase decision. More precisely these attributes have "search, experience or credence" properties [7-9]. Consumers attach considerable importance to search attributes which are quality indicators that can be tested easily, prior to purchase, by actual inspection of the good. Experience quality attributes are those that can only be confirmed after purchase and consumption of the product. Credence qualities cannot be verified even after purchase and consumption, they have a positive impact on consumer's attitude towards a product, and consequently influence consumers buying intentions [10].

For olive oil, different search attributes are proposed for olive oil such as color, smell, taste, transparency, size shape, material and color of the bottle, design of the label and the information released, brand and point of sale [11, 12]. Focusing on these search attribute for olive oil, studies on this topic present two groups of factors that allow consumers to evaluate the product: intrinsic attributes and extrinsic attributes. These factors determine perceived quality [12-15]. Several studies about olive oil perceived quality revealed that the intrinsic attributes (such as taste, color, flavour, smell) and the extrinsic attributes (packaging, price, place of sale, region of origin) have determine consumers' purchase decision [16]. However, these quality attributes are evaluated differently according to the markets. In the Greek and Dutch markets, quality and color are more important than smell, image-reputation, package, and social influences attributes [3]. Whereas Krystallis and Ness [16]; García, et al. [17] point out that Greek olive oil consumers grant no importance to the product brand. For the Canadian context, studies prove the relative importance of origin, price, and production system compared to color and appearance [3]. Studies about UK consumers demonstrate that packaging, size, and price as very determinant factors Rodolfo and Mónica [18]. Rodolfo and Mónica [18]; Delgado and Guinard [19] reveal that the Spanish market are divided on two consumers segments: consumers choosing the olive oil because of price and other were guided by the product's specific attributes, such as organic production. In the USA market, consumers consider the price, available information, and product reputation as determinant factors in the purchase of olive oil [20].

Especially for organic olive oil, Sandalidou, et al. [20]; Sandalidou, et al. [21] attest that Greek organic olive oil consumers have a positive perception of health, package, and sensory characteristics such as flavour and taste, but they are dissatisfied about price/quality, promotion, and disposition of this product [21, 22]. While price, geographic origin and certification of extra-virgin olive oil are very important attributes Italian consumers of organic olive oil according to Cicia, et al. [22]; Tsakiridou, et al. [23]. On the other hand, Tsakiridou, et al. [23]

verify that socioeconomic consumer characteristics (such as their income, their occupation) deeply affect the demand for organic olive oil [24].

For the Tunisian market, Mtimet, et al. [2] demonstrate that olive oil consumption is rooted in the Tunisian consumers tradition, shoppers are familiar with olive oil attributes, but they are indifferent to the region of origin or any other quality label, and they generally buy olive oil in bulk [3]. Oppositely, consumers in North-Mediterranean olive oil-producing countries are more interested on the region of origin, quality labels and packaging attributes. It should be noted that taste, color and smell can be considered as experience attributes because they are the results of previous consumer experiences. In addition, the choice between different olive oils depends on consumption mode and of food preparations (frying, cooking, for salad dressing...) [25]. Besides, Cacchiarelli, et al. [24] approved the importance of nutritional and health benefits and positive environmental impacts as credence attributes for olive oil [26]. According to Sinha and Batra [26] the probability of buying products is lower when the product category is high in experience/credence quality instead of searching through package label information [27].

2.2. Olive Oil Place of Purchase Preferences

Place of purchase is an additional interesting aspect related to purchase habits. Based on Delgado and Guinard [19] and Fotopoulos and Krystallis [27] studies [14, 20-24, 26-28] reported that most US consumers bought olive oil principally at the supermarket and stores (68%), in contrast with the ways in which Mediterranean consumers most frequently buy their olive oil. 41% of Cretan consumers buy olive oil at the supermarket, while 38% buy in bulk directly from the producer or farm, and 21% make oil from their own olive orchards [29].

Focusing on the Italian internal market, Giuseppe [3] demonstrate quite differences between the central-northern olive oil market and the southern Italy [4]. Consumers in the central-northern area mainly purchased extra-virgin olive oil at supermarkets or in large-scale retail stores (70%), only 23% purchase olive oil directly from grocery stores (or traditional stores) particularly when they wanted to buy high-quality olive oil. Only 5.5% of the sample bought the product at oil mills. In southern Italy market, just 27.4% of consumers buy olive oil in large-scale retail stores, whereas people who purchase olive oil directly from the producer reached 20.3%. Those who bought olive oil in other places of purchase was equally distributed: traditional stores (17.4%), local markets (17.2%) and local oil mills (17.7%).

Greek olive oil market is dominated by informal markets: more than 45% of household are providing olive oil through relative self-consumption or purchasing olive oil in bulk directly from small producers. Factors determining the choice of the place of olive oil purchase are the age of the consumer, the educational level, and the fact of living or not nearby to an olive oil producing area. However, non-significant factors are household's size and family income [6]. Moreover, Corbeto-Fabón, et al. [30] with a focus on the Spanish market, demonstrate that the preferences for olive oil attributes depend on the place of purchase [31].

The question arises as to whether the factors determining the purchase of olive oil also determine the choice of its place of purchase. It would be useful to know to what extent those search, experience and credence attributes and those individual socio-economic and demographic characteristics influence the purchase decision of olive oil and its place of purchase selection. A conceptual model to understand factor detrainning olive oil purchase and the choice of its place of purchase was proposed in Figure 1.

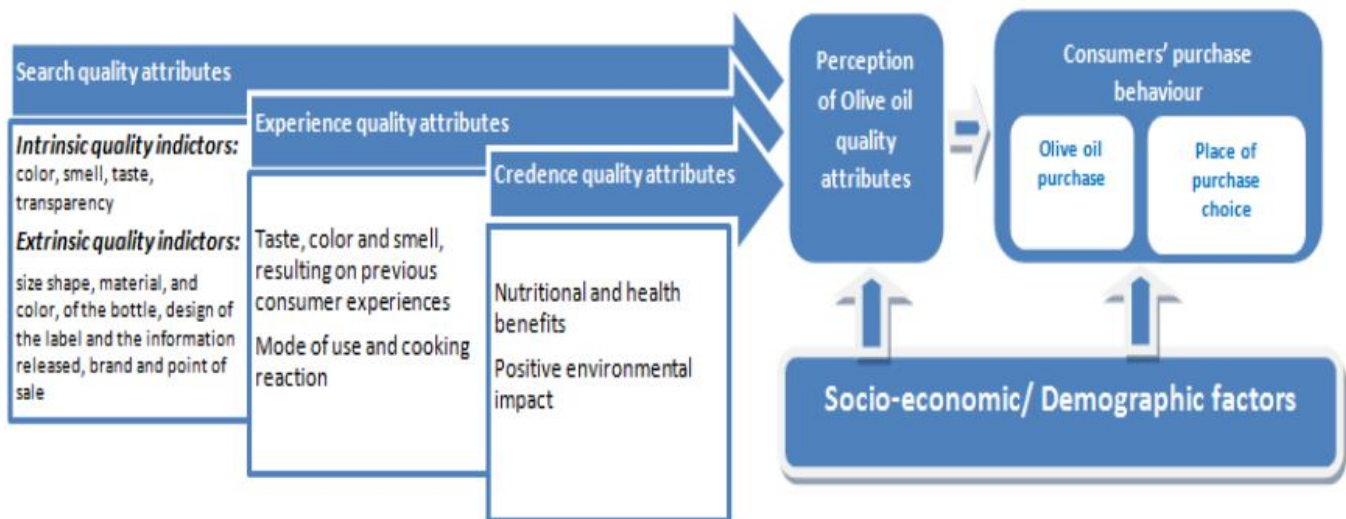


Figure 1. Conceptual framework.

3. Methodological Approach

3.1. Database

This study is based on data gathered from a questionnaire survey conducted on a sample of 216 households essentially localized in Tunis city centre and its suburbs, the North and the centre of the country, they also originate in the different regions for a better representativeness. In fact, olive oil consumption differs by living environment.

The questionnaire was addressed to the household heads. The interviewees were 61% men 68.5% married, with 64% other than 31 years old and 44% with university educational level. The "household size" variable shows that 74% of the families are composed of more than 4 individuals Table 1. The income is an important variable in determining the olive oil consumption since it reflects the purchasing power of consumers. It is well distributed among the different income classes selected, with about 45% of the middle classes, whose income is between 1001 and 2000 TND (Euro ≈3.24TND).

Table 1. Socio-demographic profile of the sample (N=216).

Gender						
Male			Female			
61.1			38.9			
Age						
Inf 30	31-40	41-50		Sup 50		
9.3	30.6	33.3		26.9		
Origin						
Tunis city center and its suburbs		North	Center	South		
18		41.3	37.1	3.7		
Marital status						
Married			Other			
68.5			31.5			
Place of residence						
North	Tunis city center and its		Center	South		
32.9	33.3		33.3	0.5		
Educational level						
Analphabet	Koranic school	Primary	Secondary		University	
1.9	2.3	20.4	31.5		44	
Household monthly income						
<500 TD	501-1000	1001-1500	1501-2000	2001-2500	2501-3000	>3000
5.6	27.3	25.9	18.5	9.3	6.5	6.9
Household's size						
1	2	3	4	5	>6	
3.7	9.7	13	26.8	26.8	20	

The questionnaire covers all the variables that can affect the consumer behaviour. It is structured into four sections: purchases (place of purchase, quantity, frequency, and budget), consumption preferences, quality attributes and indicators, and socio-demographic and economic variables of the households.

For the selected quality attributes and indicators, our assumptions focused on 25 variables that we expect to influence consumer behaviour and measure their perceptions of quality.

These variables belong to different quality attributes and indicators defined by Branger, et al. [29]; Del Giudice, et al. [13]; Jiménez-Guerrero, et al. [14]; Ward, et al. [15]; Krystallis and Ness [16]; García, et al. [17]; Rodolfo and Mónica [18]; Delgado and Guinard [19]; Sandalidou, et al. [20]; Sandalidou, et al. [21]; Cicia, et al. [22]; Tsakiridou, et al. [23]; Cacchiarelli, et al. [24]; Sinha and Batra [26]; Fotopoulos and Krystallis [27]; Corbeto-Fabón, et al. [28]; Branger, et al. [29]; Ding and He [31].

Quality indicators are divided into two categories:

- Extrinsic quality indicators and tangible attributes (6): Quality label, Packaging, Olive oil origin, points of sale, brand name, price.
- Intrinsic quality indicators (3) such as Color, odour and taste.

For inviolable attributes, we use 7 credence attributes about health and nutrition and 9 experience attributes (Smell, Taste, Color as experience attributes, mode of uses, and cooking reaction).

Each of the 25 items, respondents were asked to express, with a score from 1 to 5, the importance of quality attributes and indicators they consider when buying olive oil (1 = "strongly disagree", 5 = "strongly agree"). So, the 25 selected quality items are introduced into the database in numerical forms.

3.2. Data Statistical Analysis

Using SPSS software (20.0) descriptive statistical analysis was used to determine the socio-demographic profile of the consumers and to describe respondents' behaviour towards olive oil (perception, purchase, and consumption).

An exploratory factor analysis was conducted to determine the principal dimensions among the variables. Between the 25 items, 16 were factor-analysed, using principal component analysis (PCA) with the Varimax rotation method to establish the different dimensions of quality. The Varimax rotation was used to maximize the differences between the components extracted and to maintain correlation within the components. The Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy and the Bartlett's test were used to determine the fitness of the data. Values of 0.6 or above from the KMO measures indicated that data are adequate for PCA [31]. The items factor-analysed sets out details about the different dimensions of quality.

To evaluate the impact of socio-demographic factors, search, experience, and credence attributes on olive oil purchase decision (1) and on its place of purchase choice (2), a binomial logistic regression and a multinomial logistic regression are respectively used.

For the binomial logistic regression, the outcome variable has only two categories: it is a dichotomous outcome variable describing the purchase or not of olive oil ("1=yes" and "0=no").

For the multinomial logistic regression, the outcome variable has six categories, they describe the six alternatives of olive oil places of purchase: 0= No purchase, 1= olive oil mills, 2=Wholesalers, 3= Friends and relatives, 4= Wholesalers, 5= Retail stores".

For both binomial and multinomial logistic regression, the predictor variables refer to all the dimensions resulting on the previous factor analysis using principal component analysis.

4. Results

4.1. Consuming Peculiarities of Olive Oil in the Tunisian Market

The results of our survey confirm that the purchases of olive oil on the Tunisian market are made essentially in bulk. Indeed, more than 4/5 of our sample (86.1%) confirm having bought the olive oil and they did it in bulk. The domestic consumption of Tunisian olive oil is based on family/friends reserves and the direct supply of olive mills. More than half of the interviewees (53.7%) reported that they bought olive oil primarily from families and friends. 21,3% of interviewed consumers bought it directly from olive oil mills and producers. The market share of wholesalers, retail stores and weekly markets is less important with respective percentages of 4.2 %, 4.6 % and 2.3 % [Table 2](#).

Table 2. The purchasing place choice for olive oil.

Purchasing place of olive oil (%)				
No purchase	Retail stores	Olive oil producers/mills	Wholesalers	Friends and relatives
13.9	6.9	21.3	4.2	53.7

Respondents were asked to express, with a score from 1 to 5, what quality attributes and indicators they consider when buying olive oil ([Table 3](#)). The most important are «taste" (average score 4.83) and "smell" (4.69). In contrast, the less important are attributes about cooking reaction "do not darken" (2.13) and " with high smoking point" (3.3).

Table 3. Quality attributes and indicators perception.

Quality attributes and indicators	Minimum	Maximum	Mean	Standard
An Oil that do not darken	1	5	2.13	1.057
An oil with high smoking point	1	5	3.3	1.21
Brand Name	1	5	3.81	1.267
Color	1	5	4.57	0.692
Cook better	2	5	4.84	0.498
Fry better	1	5	1.7	1.068
Healthy	4	5	4.97	0.177
Multipurpose	1	5	4.27	0.902
Nutritional value	2	5	4.94	0.298
Origin	1	5	4.37	1.012
Packaging	1	5	3.78	1.098
Price	1	5	3.89	1.498
Purchasing place	1	5	4.19	1.068
Quality label	1	5	3.97	1.032
Smell	2	5	4.69	0.594
Taste	4	5	4.83	0.374

This descriptive analysis summarizes the burden of different quality attributes and indicators on olive oil quality perceptions; it should be deepened by a diagnosis of the determinants of the olive oil purchase on the Tunisian market (paragraph 4.3). To this end, an exploratory factor analysis of the olive oil quality attributes and indicators is used to determine the principal dimensions among the variables and to highlight the dimensions of research quality indicators, experience, and beliefs quality attributes.

Table 4. Factor analysis results of the olive oil quality attributes and indicators (Varimax rotation).

Kaiser–Meyer–Olkin (KMO) Measure of sampling adequacy		0.688					
Bartlett's test for sphericity	Approx. chi square	803.29					
	df	120					
	Sig.	0.000					
	Factors	1	2	3	4	5	6
Factor 1 Extrinsic quality indicators	Quality label	0.818	0.1	-0.065	-0.084	-0.004	-0.051
	Packaging	0.803	-0.025	-0.043	0.002	0.06	-0.052
	Origin	0.778	0.049	0.008	0.29	-0.076	0.233
	Purchasing place	0.756	0.057	0.002	0.239	-0.14	0.275
Factor 2 Intrinsic quality indicators	Smell	0.035	0.846	-0.005	0.074	-0.019	0.016
	Taste	0.047	0.842	0.219	-0.066	-0.032	0.044
	Color	0.097	0.614	-0.079	0.303	0.227	-0.018
Factor 3 Health / Nutrition	Nutritional value	-0.053	0.041	0.863	0.011	-0.006	-0.09
	Healthy	-0.042	0.079	0.861	0.118	-0.017	-0.02
Factor 4 Price/Brand	Price	0.018	0.018	0.172	0.819	0.015	0.024
	Brand Name	0.339	0.191	-0.032	0.654	0.039	-0.028
Factor 5 Experience attributes - mode of use	Multipurpose	-0.129	0.194	-0.167	0.057	0.657	0.162
	Fry better	0.067	-0.122	0.18	-0.209	0.647	-0.159
	Cook better	-0.046	0.049	-0.033	0.369	0.556	0.027
Factor 6 Experience attributes - cooking reaction	An oil with high smoking point	0.041	0.208	-0.102	-0.011	-0.161	0.732
	An Oil that do not darken	-0.179	0.219	0.015	-0.015	-0.275	-0.701
Factor statistics							
Eigen values		3.186	2.123	1.623	1.412	1.088	1.023
% of variance		19.912	13.266	10.146	8.827	6.8	6.395
Cumulative variance		19.912	33.177	43.323	52.15	58.95	65.346

4.2. Factor Analysis Results of the Olive Oil Quality Attributes and Indicators

16 items were factor-analyzed, using principal component analysis (PCA) with the Varimax rotation method to establish the different dimensions of quality (Table 4). Value of 0.688 for the Kaiser–Meyer–Olkin (KMO) measures indicated that data are adequate for PCA, and the Bartlett’s test was significant.

The exploratory factor analysis with Varimax rotation of the 16 variables result edit a six-factor solution that explains 65.34% of the total variance. All six factors had eigen values greater than 1 (Table 4). The first dimension was labelled as “Extrinsic quality indicators”, which explained 19.91% of the total variance; it is determined by attributes related to quality label, packaging, origin and purchasing place. The second dimension “intrinsic quality indicators” includes three indicators (smell, taste and color) and explain 13.26% of the total variance. The third dimension “health / nutrition” focuses on these tow credence attributes and explain 10.14% of the total variance. The fourth dimension, explaining 8.82% of the total variance, is determined by tow attributes “Price/Brand”. The fifth dimension called “Experience attributes about olive oil mode of use” combines the attributes related to the different mode of use of olive oil: a multipurpose oil, an oil that fry better and an oil that cook better. This dimension explicates 6.8% of the total variance. The sixth dimension, which explain6.39% of the total variance, covers two experience attributes about cooking reaction (an oil with high smoking point and an oil that do not darken).

Knowing that the most common and reliable criterion in extracting factors is the use of eigen values, all factors are with eigen values greater than 1, so they were retained because they were considered significant. In addition, all the items showed factor loading of more than 0.50.

These six quality dimensions of olive oil, in addition to socio-economic and demographic consumers’ characteristics, are used as predictor variables to identify factors determining olive oil purchase decision (1) and its place of purchase choice (2).

4.3. Factors Determining the Purchase of Olive Oil

- All six dimensions of the olive oil quality and the socio-demographic and economic consumers’ characteristics (gender, origin, educational level, household's size) were taken into consideration in the Binary logistic regression analysis and the dependent variable (categorical variable) was considered “the purchase of olive oil” and could have only two values, 1 or 0, as follows:
- 1: the consumer purchase olive oil.
- 0: the consumer does not purchase olive oil.

The values of the regression coefficients and their statistical significance obtained by Enter logistical regression method were included in Table 4.

The logistic regression could use two indicators such as Cox and Snell R² and Nagelkerke R² that estimates the contribution of predictor variable to the variability of dependent variable. We used the Nagelkerke R² indicator to analyse the contribution of all predictor variables to the variability of the dependent variable. Knowing that Cox and Snell R² indicator usually underestimates the real value, the test results (Table 4) based on the 10 predictor variables could explain in 40,3% the effect of the environment on the artefacts. The results from the classification table showed that the mathematical model predicts 86.6% of cases correctly, so we could conclude that it is a good performing model, and its regression coefficients (β) are shown in “Variables in the equation” (Table 5).

Ten predictive variables were analysed by regression analysis, but only three of them had a statistical significance (Table 5): Educational level, Factor 1 referring to extrinsic quality indicators and Factor 4 about the consumers’ sensibility to “Price and Brand”. The remaining predictive variables did not show a statistical significance.

By interpretation of the sign of the β coefficients of the independent variables, the educational level, the factor 1 related to consumers’ sensibility to extrinsic quality indicators (quality label, packaging, origin, purchasing place) have a positive effect on olive oil purchase. However, the sensibility of the consumer to “Price/Brand” quality indicators (factor 4) has a negative effect on olive oil purchase.

The educational level of Tunisian consumers has a positive and significant effect on the purchase of olive oil: by reference to the Odds ratio, it can be argued that when the consumer is with high educational level, the purchasing propensity is 4.7 higher than when he was with primary or secondary educational levels, or also illiterate. In addition, consumers who attach greater importance to extrinsic indicators of quality, particularly the origin of the olive oil, quality labels, packaging, and place of purchase) have a higher probability of purchasing olive oil (Odds ratio=2.51).

4.4. Factors Determining the Choice of the Purchasing Place of Olive Oil on the Tunisian Local Market

A multinomial logistic regression model was used to identify the relationships between dependent variable “choice of the purchasing place of olive oil” and independent variables (the six dimensions resulting on the factor analysis using principal component analysis and four socio-economic and demographic variables).

The dependant variable “choice of the purchasing place of olive oil” has m categories (m=5); having no olive oil purchase (and consequently no choice of a place of purchase) was specified as the baseline category (m=1). The probability of membership in other categories is compared to the probability of membership in the reference category. Moreover, there will be five predicted log odds, one for each category relative to the reference category.

Results of the multinomial logistic analysis indicated that the predictor model provides a statistically significant prediction of the choice of place of purchase, $-2 \text{ Log Likelihood}=391.890$, $\chi^2=150.299$ and $p=0.000$. The Nagelkerke R² indicated that the model accounted for approximately 54.6% of the total variance, Cox and Snell R²=0.501 and McFadden R²=0.277. Prediction success for the cases indicated an overall prediction success rate of 62%.

The Table 5 presents the regression coefficients, the Wald test, adjusted odds ratio [Exp(B)], for the odds ratio for each predictor variable used for the four alternative of olive oil place of purchase. The results indicated that some predictors were not statically significant predictors for the four categories of olive oil place of purchase. There was no significant effect such as household's size, factor 2 relative to intrinsic quality indicators perception,

factor3 about health and nutrition as credence quality attributes, factors 5 and 6 concerning consumers' sensibility to experience quality attribute.

Table 5. The binary logistic regression of the purchase decision model (Enter method).

Model summery							
Step		Cox and Snell R ²			Nagelkerke R ²		
1		0.223			0.403		
		β	S. E. β	Wald χ^2	Degrees of freedom	P value	Exp (β)
Step 1 ^b	Consumer origin (1 if from production area, 0 if not)	0.630	0.523	1.448	1	0.229	1.877
	Educational level (1 if with high education. 0 if not)	1.553	0.676	5.286	1	0.021 ^d	4.727
	Gender (1 if women, 0 if men)	0.284	0.496	0.328	1	0.567	1.329
	Household's size(sz) (1 if ≥ 5 members, 0 if not)	-0.332	0.482	0.475	1	0.491	0.717
	Factor1. Extrinsic quality indicators	0.921	0.341	7.303	1	0.007 ^c	2.512
	Factor2. Intrinsic quality indicators	0.277	0.220	1.589	1	0.208	1.320
	Factor3. Health / Nutrition	-0.183	0.483	0.144	1	0.704	0.832
	Factor4. Price/Brand	-1.724	0.468	13.572	1	0.000 ^c	0.178
	Factor5. Experience attributes - mode of use	-0.187	0.380	0.242	1	0.623	0.829
	Factor6. Experience attributes - cooking reaction	-0.077	0.289	0.071	1	0.789	0.926
	Constant	2.049	0.715	8.219	1	0.004	7.757

Note:

- a. Estimation terminated at iteration number 7 because parameter estimates changed by less than 0.001.
- b. Variables entered in step 1: gender, origin, educational level, household's size, factor 1, factor 2, factor3, factor 4, factor5, factor 6.
- c. Statistically significant for $p < 1\%$
- d. Statistically significant for $p < 5\%$.

Table 6 presents the factors that influence the choice of olive oil points of sales based on the results of a multinomial logit model.

For the olive oil producers /mills as first category of olive oil place of purchase, educational level, and the factors one and four describing consumers' sensibility to extrinsic quality indicators were statically significant. Educational level was a significant predictor ($p < 5\%$) of mills choice for olive oil purchase with a positive impact. In fact, with a highest educational level, the probability of buying olive oil from mills increase [Exp (β)=4,8]. Furthermore, factor 1 describing the importance of extrinsic quality indicators such as quality label, packaging, origin and purchasing place as quality indicators for Tunisian consumers, was a significant factor determining the choice of mills as point of purchase ($p < 1\%$). It has a positive impact: for consumers finding factor1 very important for quality assessment and for purchase decision, the probability to opt for mills as olive oil supplier increase de 5,02. By buying olive oil from mills, consumers are sure about the origin of the product, the quality label "organic olive oil", they consider producers/mills as a guarantor of quality. Additionally, the importance of brand/price as quality indicators for Tunisian consumers (factor 4) is a very significant factor ($p < 5\%$), with negative effect on olive oil producer choice: the more the consumer considers the brand and the price as olive oil quality indicators, the less likely it is to buy this oil from mills. Indeed, consumers who buy from olive oil from mills, buy olive oil in bulk and in large quantities, at an annual frequency, therefore they pay large sums of money in return.

Only one predictor is significant for the "wholesalers" as place of purchase of olive oil: The gender is a significant ($p < 5\%$) and a main factor determining the choice of wholesalers for the olive oil purchase. In fact, women were 17 times more likely to buy olive oil from wholesalers look for the lowest prices and to save money.

When the dependant variable is "friends and relatives", four predictors are significant: consumer origin, educational level and factors "1 and 4". The explicative variable "consumers origin" is significant ($p < 1\%$) and have a positive impact on buying olive oil from friends and relatives. In fact, the originating from an olive oil producing area are 5,4 times more likely to buy olive oil from friends, family, and relatives. "Educational level" is a significant variable ($p < 5\%$) with a positive influence on the decision of buying olive oil from relatives; the transition to the high educational level increased the probability of purchasing olive oil from family and friend 4-folds. The first factor describing consumers' sensibility to extrinsic quality indicators (except brand and price indicators) is statistically significant at 5%. With an Exp (β) ≈ 2 , it has a positive effect on the decision of purchasing olive oil of friends and relatives. Especially in the case of consumers belonging to producing countries, when consumers buy olive oil directly from friends and relatives olive oil producers, they are sure about the origin of the product, the quality label "organic olive oil", they also consider these suppliers as a guarantor of quality. Place of purchase is part of the extrinsic indicators determining quality, but also, it is a choice to be made regarding supply areas. As for the olive oil mills, factor 4 "brand/price" as quality indicators for Tunisian consumers are significant ($p < 1\%$), with negative effect because consumers who buy from friends and relatives, buy olive oil in bulk and in large quantities, at an annual frequency, therefore they pay large sums of money in return.

For the retail stores as category of olive oil place of purchase, factor 1 describing the importance of extrinsic quality indicators such as quality label, packaging, origin and purchase area, was a significant factor determining the choice of retail store ($p < 1\%$). It has a positive impact: for consumers finding factor1 very important for quality assessment, the probability to opt for retail stores increase de 4,08.

Table 6. The results of the multinomial logit model-Place of purchase choice.

Place of purchase ^a	Parameter	β	S. E. β	Wald	Degrees of freedom	P value	Exp (β)
Olive oil producers -mills	Constant	0.642	0.825	0.606	1	0.436	-
	Factor1. Extrinsic quality indicators	1.614	0.433	13.877	1	0.000	5.025
	Factor2. Intrinsic quality indicators	0.341	0.275	1.534	1	0.216	1.406
	Factor3. Health / Nutrition	0.098	0.564	0.030	1	0.862	1.103
	Factor4. Price/Brand	-1.262	0.519	5.900	1	0.015	0.283
	Factor5. Experience attributes - mode of use	-0.097	0.418	0.054	1	0.816	0.907
	Factor6. Experience attributes - cooking reaction	0.285	0.337	0.714	1	0.398	1.329
	Educational level (1 if with high education. 0 if not)	1.575	0.737	4.563	1	0.033	4.830
	Gender (1 if women. 0 if men)	0.454	0.577	0.620	1	0.431	1.575
	Household's size (1 if ≥ 5 members. 0 if not)	0.001	0.564	0.000	1	0.998	1.001
	Consumer origin (1 if from production area. 0 if not)	-0.097	0.618	0.025	1	0.875	0.908
Wholesalers	Constant	-3.294	1.710	3.709	1	0.054	-
	Factor1. Extrinsic quality indicators	-0.333	0.639	0.271	1	0.603	0.717
	Factor2. Intrinsic quality indicators	0.367	0.427	0.739	1	0.390	1.444
	Factor3. Health / Nutrition	0.574	1.765	0.106	1	0.745	1.776
	Factor 4. Price/Brand	0.090	0.846	0.011	1	0.916	1.094
	Factor 5. Experience attributes - mode of use	-0.924	0.702	1.733	1	0.188	0.397
	Factor 6. Experience attributes - cooking reaction	-0.221	0.539	0.167	1	0.682	0.802
	Educational level (1 if with high education. 0 if not)	1.803	1.099	2.689	1	0.101	6.065
	Gender (1 if women. 0 if men)	2.811	1.216	5.348	1	0.021	16.632
	Household's size (1 if ≥ 5 members. 0 if not)	0.086	0.913	0.009	1	0.925	1.090
	Consumer origin (1 if from production area. 0 if not)	-1.170	0.955	1.501	1	0.221	0.310
Friends and relatives	Constant	0.929	0.797	1.360	1	0.243	-
	Factor1. Extrinsic quality indicators	0.782	.370	4.459	1	0.035	2.186
	Factor2. Intrinsic quality indicators	0.269	0.241	1.246	1	0.264	1.309
	Factor3. Health / Nutrition	-0.218	0.523	0.173	1	0.677	0.804
	Factor4. Price/Brand	-1.928	0.494	15.250	1	0.000	0.145
	Factor5. Experience attributes - mode of use	-0.093	0.403	0.053	1	0.818	0.911
	Factor6. Experience attributes - cooking reaction	-0.218	0.309	0.499	1	0.480	0.804
	Educational level (1 if with high education. 0 if not)	1.572	0.705	4.977	1	0.026	4.818
	Gender (1 if women. 0 if men)	-0.024	0.538	0.002	1	0.964	0.976
	Household's size (1 if ≥ 5 members. 0 if not)	-0.506	0.519	0.953	1	0.329	0.603
	Consumer origin (1 if from production area. 0 if not)	1.636	0.605	7.313	1	0.007	5.134
Retail stores	Constant	1.348	0.887	2.309	1	0.129	-
	Factor1. Extrinsic quality indicators	1.406	0.540	6.769	1	0.009	4.078
	Factor2. Intrinsic quality indicators	0.371	0.404	0.844	1	0.358	1.449
	Factor3. Health / Nutrition	-0.498	0.556	0.803	1	0.370	0.608
	Factor4. Price/Brand	-1.923	0.587	10.741	1	0.001	0.146
	Factor5. Experience attributes - mode of use	-0.099	0.491	0.041	1	0.840	0.905
	Factor6. Experience attributes - cooking reaction	-0.082	0.419	0.038	1	0.845	0.921
	Educational level (1 if with high education. 0 if not)	-0.486	1.053	0.213	1	0.644	0.615
	Gender (1 if women. 0 if men)	-0.939	0.861	1.188	1	0.276	0.391
	Household's size (1 if ≥ 5 members. 0 if not)	-1.092	0.793	1.897	1	0.168	0.336
	Consumer origin (1 if from production area. 0 if not)	-0.539	0.805	0.449	1	0.503	0.583

Note: ^a The reference category is: 0 "No purchase".

Additionally, the importance of brand/price as quality indicators for Tunisian consumers (factor 4) is a very significant factor ($p < 1\%$), with negative effect on retail stores choice: the less the consumer considers the brand and the price as olive oil quality indicators, the more likely it is to buy this oil from retail store. In fact, consumers buy olive oil from retail store in small quality but at relatively high prices. These results are in accordance with predictions from previous studies [14, 19].

5. Discussion

Olive oil purchase habits of Tunisian are based on bulk purchase from family/friends reserves and olive mills. These results confirm those of Fotopoulos and Krystallis [27] reporting that 38% of Cretan consumers buy olive oil in bulk directly from the producer or farm, and 21% make oil from their own olive orchards [28]. This is the same situation in the Greek olive oil market where 45% of household are providing olive oil through relatives or directly from small producers Van Waterschoot, et al. [6]. Jiménez-Guerrero, et al. [14] establish the same results and state that similar figures can be associated with other Mediterranean producing countries [29]. According to these authors, this habit seems to be a consequence of the consumer experience and a result of their intrinsic cultures. The place of purchase still related to consumers' culture and purchase habits.

The result of the binary logistic regression about factor determining olive oil purchase highlights the positive impact of the educational level and of consumers' sensibility to extrinsic quality indicators (quality label, packaging, origin, purchasing place), and the negative impact of the consumer's sensibility of to "Price/Brand". These findings confirm those of other studies. In fact, Jiménez-Guerrero, et al. [14] reported that literature review proves that the extrinsic attributes of olive oil are the most important when consumers face the act of purchase [29]. However, intrinsic attributes (e.g., colour or flavour) is on the second place, except for Japanese consumers. In the other hand, the probability of buying olive oil is decreasing as consumers' sensitivity to prices and brands increases: the more importance Tunisian consumers attach to these extrinsic indicators of quality, the lower the purchasing propensity of olive oil (Odds ratio=0.178). Differently to the postulates of Jiménez-Guerrero, et al. [14] the attribute with the highest relative importance is the price for consumers belonging to both producer and non-producer countries [29]. Results of the multinomial logistic regression model about the choice of the purchasing place of olive oil underline the non-significant effect of household's size, consumer's sensibility of intrinsic quality indicators and consumers' sensibility to experience and credence quality attributes. Indeed, many consumers still do not know olive oil benefits. For this reason, providing information, mainly through advertising, is necessary, to enhance consumers' awareness of olive oil's nutritional content and health benefits. This was also recommended by other authors such as Sandalidou, et al. [21] and Jiménez-Guerrero, et al. [14]; Cicia, et al. [22]; Tsakiridou, et al. [23]; Cacchiarelli, et al. [24]; Sinha and Batra [26]; Fotopoulos and Krystallis [27]; Corbeto-Fabón, et al. [28]; Branger, et al. [29]. Awareness-raising and information regarding olive oil intrinsic quality attribute will also be an asset. For all categories of olive oil purchase except for wholesalers, consumers' sensibility to extrinsic quality indicators were statically significant, with positive impact for the first factor describing consumers' sensibility to extrinsic quality indicators other than brand and price and with negative impact for "brand and price" indicators. The gender is a significant and a main factor determining the choice of wholesalers for the olive oil purchase, while educational level is significantly determining the selection of "friends and relatives" and mills for the olive oil procurement. Consumer origin is especially significant for supplies carried out from relatives.

Based on the two models, it can be confirmed that some factors determining the purchase of olive oil also determine the choice of its place of purchase (except for "wholesalers" and "retail store" as purchase places). These factors are "educational level" as socio-demographic factor and factors 1 and 4 relative to all extrinsic quality indicators. Indeed, high educational level and consumer sensibility to extrinsic quality indicators such as "quality label, packaging, olive oil origin, points of sale" have a positive effect on olive oil purchase and promote olive oil supply from mills and friends and relatives. On the other hand, consumer sensibility to brand name and price, also extrinsic quality indicators, have a negative impact on purchase decision and on the choice of mills, relatives, and store retail, as suppliers of olive oil. There are also other factor determining the choice of "friends and relatives" as buying place, it's the consumer origin: if consumers come from a production area, the probability of purchase from family and friends increases. In addition, "gender" as socio-demographic factor has a positive and significant impact on olive oil purchase from wholesalers. Women, head of household, are more likely to buy from wholesalers.

These results confirm the assumptions of Corbeto-Fabón, et al. [30] about impact of olive oil quality attributes perception on place of purchase choice [31]. In addition, some assumptions of Vlontzos and Duquenne [5] about the Spanish market are confirmed: the educational level and the fact of living or not nearby to an olive oil producing area influence place of purchase choice, while the impact of household's size is not significant [6].

6. Conclusions and Implications

Consumers' purchasing behaviour is affected to varying degree by different factors: socioeconomic and demographic factors, the relative importance accorded by Tunisian consumers to the olive oil intrinsic and extrinsic quality indicators and olive oil experience and credence attributes. The results obtained here prove that having a high educational level and being sensitive to some extrinsic quality indicators such as origin, quality label, packaging and place of purchase have a positive and significant impact on olive oil purchase decision and promote the choice of mills and relatives as olive oil place of purchase. Whereas consumers sensibility to brand and price has a negative and significant impact on purchase decision and on the choice of these point of sale of olive oil in the Tunisian market. It should be noted that mills and friends/relatives are the main supply areas for Tunisian consumers. In addition, being a women head of household increase the probability of olive oil purchase from wholesalers. Being originating in an olive oil production area increase the probability of purchasing olive oil from friends and relatives. Based on these results, it is recommended that Tunisian olive oil institutions work on changing Tunisian purchase behaviour from bulk to bottled products, from an annual act of purchase to more frequent purchase of small quantities to meet consumer expectations for quality attributes and to enhance olive oil purchase. This will facilitate the transition from informal (weekly market, friends, and relatives) to formal distribution (supermarket, hypermarket, retail stores, etc.). Producers' marketing strategies must consider the consumer profile (age, gender, origin, and educational level) and behaviour (frequency of purchase, preferred size of the package, awareness about quality attributes) to provide an adequate product, compliant with and met the requirements of the Tunisian consumers. This strategy can be based on olive oil's peculiarities, origin and quality labels. Particularly, they have to strengthen the in-store advertising (e.g. Tasting sessions as promotion campaigns at supermarkets and hypermarkets) to allow consumers to experience the olive oil properties, so they can make their purchase decisions of bottled and branded olive oil based on sensory factors. In addition, companies can

strengthen consumers' awareness about olive oil health benefits and mode of use. So, experience and credence quality attributes could become more significant for Tunisian consumers.

In conclusion, the present study is in effect an exploratory study. Sample size and representativeness are its main limitations. It emphasizes the interaction between the olive oil purchase decision and the choice of its place of purchase, based on an investigation quality attributes and indicators perception.

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