

*Full Length Research Paper*

# Consumers' awareness of food labeling: A case study of United Arab Emirates

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**The main objective of this study is to examine consumers' awareness for food labeling in United Arab Emirates (UAE), along with identification of the socioeconomic characteristics and attitudes which make consumers aware of the subject. The UAE is an economy with a peculiar nature; more than 80% of its residents are expatriates from all over the world. A total of 500 respondents from all over the UAE were randomly selected and surveyed through face-to-face interviews. The deterministic statistics and frequency tables of data were prepared and analyzed. An ordered probit model was utilized to see the effect of social characteristics and attributes on the consumers' awareness for food labeling. According to the results, 89.6% of respondents indicated that they read information provided on food labels. Among the attributes written on the labels, the three most important that were read by respondents more frequently were expiration date, list of ingredients, and the country of origin. The results of ordered probit model shows that the probability of reading food labels more frequently increases with older, more educated, and those who have more children under age of 18.**

**Key words:** Consumer's awareness, food labeling, ordered probit model, imported food, healthy diet.

## INTRODUCTION

Food labeling is a major instrument enabling consumers to have information about the kind of food they purchase and make nutritionally appropriate choices. Having a supportive marketing environment that provides content of food items can be considered as a principle in promoting the health of consumers. Providing food content information on packets can be thought of as an important element for consumer protection. "Consumers have as much right to know the nutrient content of the foods they choose to purchase as they do to know its country of origin and that it is safe to eat" (Cowburn and Stockley, 2005). "Labeling includes any written, printed or graphic matter that is present on the label, accompanies the food, or is displayed near the food, including that for the purpose of promoting its sale or disposal" (Joint, 2007). To assist international trade and global

consumers, international guidelines, in the form of the Codex General Standard for the labeling of pre-packaged foods is developed and revised as needed. The most recent guidance has been revised in 2007 and requires all member countries (over 170) to follow.

The United Arab Emirates (UAE) is a member of the Gulf Cooperation Council (GCC); besides UAE, there are five other countries that include Bahrain, Kuwait, Oman, Qatar, and Saudi Arabia. The Gulf Standards Organization (GSO) is responsible for developing food and other standards in the GCC. This organization is continuously updating food standards in all member countries. The existing standards have been harmonized in the past few years within the guidelines of the Codex Alimentarius, International Organization for Standardization (ISO), and other international organizations. The GSO member countries have been revising the shelf life and labeling of food items which were updated in 2007 from the earlier standards issued in the nineties. As the food safety issue has become an important topic all around the world, it is a major concern in the GCC region as well. The issue is

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more critical since many food products are imported from all around the world. As a result of food threats that have occurred in the region within the past decade, the concern about the ability of GCC governments to guarantee the safety and quality of food imports became an important topic (Al-Kandari and Jukes, 2009). The researchers are not aware of other research studies done in GCC region or other neighboring countries related to the issue in question.

Many countries in the world are developing mandatory or voluntary programs to assure food safety by using traceability in food value chain "Traceability is defined as the ability to follow the movement of a food through specified stage(s) of processing, production, and distribution" (Souza-Monteiro and Caswell, 2004). In order to facilitate communication regarding existing direct or indirect risk to consumer's health from food or food contact material, a rapid alert system for food (GRASF) has been developed in Saudi Arabia for all GCC countries. In addition to GRASF, food and non-food standards in the GCC and Yemen is developed by GSO. The Emirates Authority for Standardization and Metrology (ESMA) is working with GSO to either develop or adopt the standard necessary in food production processing and handling. The establishment and enforcement of food safety regulation is under the responsibility of UAE Ministry of Environment and Water (MOEW). The MOEW is working with the National Food Safety Committee (NFSC) and Veterinary Committee (VC) to deal with food, meat, and poultry related matters (Taha, 2012).

The majority of GCC countries have low food-sufficiency rates for the main food commodities. As a result of arid climate and shortage of arable land, the UAE relies on importing most of the basic food items. According to the UAE National Bureau Statistics (2012), the contribution of agriculture, livestock, and fishing to the GDP of the country is less than 1% (0.8%) and only 1% of land is available for agricultural production. Even where land is available for agriculture, the country faces severe irrigation water shortages. As a result of that, achieving food security depends mostly on food imports which have been steadily rising in recent years. The steady increase in food imports is mainly because of high income and population growth rate. UAE is importing food items mainly from Germany, United Kingdom, Italy, China, India (mainly rice), United States, Egypt (mainly rice and fruits), Brazil (mainly beef and poultry), and New Zealand (mainly beef and lamb). The countries have mandatory food labeling regulations. The imported food products are regularly inspected at the time of entry to UAE, at production stage, and at the retailing places. Both imported and locally produced food items are required to have the same food safety regulations and labeling requirements (Taha, 2012).

In UAE, the self-sufficiency ratio for cereal is none, compared to fruits (68.75%) and vegetables (54.23%). According to the Food and Agriculture Organization

(FAO), there is some food production in the UAE, but most of the food is imported. The total value of agricultural imports of UAE was \$4.825 billion (AED17.746 billion). The largest consumption of food groups is vegetables, cereals and fruits (562, 390, and 372 g/person/day, respectively) (FAO, 2011). A reliable and uniform food production in the exporting countries will ensure quality and safety of food in UAE and avoid any food security concerns. The major food imports of UAE are milled paddy rice, sugar, food prepared, oil of palm, pistachios, wheat, tea, chicken meat, dry-whole cow milk, and chocolate products. UAE is the second largest rice importer in the world (\$327.80 million = AED 1205.65 million) after Saudi Arabia; and the fifth largest refined- sugar importer of the world (\$222.20 million = AED 816.59 million). Wheat is a major UAE imported commodity due to its multiple uses and ranks ninth in total UAE food imports (FAO, 2011).

In the UAE, such as the case in most developing economies, increasing consumer awareness of nutritional issues constitutes an urging need on behalf of the Emirati Government to avail accurate and standardized nutrition labeling. It is obvious that nutrition sells today to consumers, from marketing standpoint, making nutrition an integral part of product development and promotion. Consumer feedback is a powerful mechanism for manufacturers in developing new food products that provide the health and nutrition characteristics sought by the public. Food marketers, in general, oppose any labeling proposals that may threaten their control of food packages. Food labels are thought to be the source of information that Emirati people rely on when assessing any information regarding the safety or quality of the food they eat. GSO is still working on the issue of putting standards for packed food labels to make sure that customers get all detailed information about the goods they buy.

Accordingly, the main objective of this study is to examine the consumer's awareness for food labeling in the UAE and to identify the socioeconomic characteristics and attitudes which make the respondent aware of the subject. The study utilized a cross-section survey to achieve its objective. The study should be considered a good source of information for both food-policy makers and marketers to value the kind of information that the UAE consumer seeks. Global studies on the use of food labels reveal that consumers want comprehensive nutrition information on food labels (Caswell and Mojduszka, 1996; Cowburn and Stockley, 2005; Drichoutis et al., 2009; Kiesel and Villas-Boas, 2007; Loureiro et al., 2006; Wills et al., 2009). As consumers' awareness for dietary preferences increases, consumers want more information to be provided on the labels. As indicated by Caswell and Padberg (1992), food labels play important roles in the food marketing via their impact on product design, advertising, consumer confidence in food quality, and consumer education on diet and health. As a result of

previous research on the relationship between diet and health, consumer's interest in the nutritional content of specific foods has increased. That is why the future of food information services is important. With the growing attention to *Escherichia coli* outbreaks and mad cow disease, consumers are increasingly questioning the food they eat. In response, many in the food industry are beginning to provide both transparent and convenient information regarding food's history. Many small scale farms recognized this needed service and have created blogs that explained general farming principles, provided photos of the land, animals, and equipment, and portrayed the daily lives of farmers and their families (Kline, 2007).

The literature on food labeling can be thought of in two categories. In the first category, researchers searched the consumer's awareness and preferences for food labeling. As for the second category, the respondents' willingness-to-pay (WTP) for labeled food is analyzed. As indicated before, because of some possible diseases resulting from it, a significant number of researches were conducted on the labeling of meat. Consumer preferences for labeling of fresh or frozen meat in retail stores were analyzed by different researchers (Lusk and Fox, 2002; Piedra et al., 1995; Schupp et al., 1998). Lusk and Fox (2002) estimated the value of policies that would mandate labeling of beef from cattle produced with growth hormones or fed genetically-modified corn. At no cost, 85% of respondents desired mandatory labeling of beef produced with growth hormones and 64% of respondents preferred mandatory labeling of beef fed genetically-modified corn. Piedra et al. (1995) found out that the rural respondents of Louisiana, USA, placed more emphasis on nutritional labeling than did urban respondents.

While there was a voluntary nutrition labeling of packaged domestic fresh meats in retail stores, there was mandatory country-of-origin labeling law of fresh meat at both the state and national levels in the USA. Availability and use of these labels in Louisiana retail stores were examined by Schupp et al. (1998). One-half of the responding households perceived that these nutrition labels were in use in stores, and when available, they were used by most respondents. In another study, Schupp and Gillespie (2001) surveyed beef handling firms in Louisiana, USA, by phone. The sample included processors, retailers and restaurants. The researchers tried to identify whether the handlers were supporting the mandatory country-of-origin labeling or not. There was a considerable interest in country-of-origin labeling of fresh or frozen beef amongst the handlers. Ibrahim et al. (2010) also examined the factors that influence university students' willing to purchase transgenic meat. Results showed that respondents who said they read labels when shopping were more likely to purchase transgenic meat. Results suggested that respondents who trust scientists to tell them the truth about transgenic meat were more

likely to purchase transgenic meat. Respondents who identified themselves as sophomores, however, were less likely to consume transgenic meat.

Some other studies have been conducted to analyze consumer's awareness and preferences for imported aquaculture products (Joseph et al., 2009; Wozniak, 2010). Wozniak (2010) questioned the issue of country of origin labeling (COOL) and salmon consumption. Using a nonlinear Almost Ideal Demand System (AIDS) model, the demand for 3 salmon products was estimated: precooked, uncooked fresh, and uncooked frozen. COOL had no significant impact on consumer demand for the three products. Joseph et al. (2009) developed a conceptual model of heterogeneous consumers that examines the consequences of partial Mandatory Country of Origin Labeling (MCOOL) implementation on welfare and diversion. Numerical simulation results showed that diversion is possible in the partial MCOOL scenario and the higher the perceived quality of domestic fish the greater the diversion of low-quality imports to the non-labeled market. Real consumer surplus was greatest under total MCOOL implementation when quality differences between domestic and foreign fish are perceived to be great.

As for WTP studies, the researchers tried to find consumers' awareness of the labeling and if consumers want to pay extra over the original price. Prathiraja and Ariyawardana (2003) conducted a study with a view of identifying the market for nutritional labeling and the factors that influence the consumer's willingness-to-pay for nutritional labeling in Sri Lanka. A significantly greater proportion of individuals in the age category of 36 to 50 years, individuals with tertiary education, individuals with special dietary status, and households with less than four members were willing to pay more for the nutritional labels. Tonsor and Shupp (2009) evaluated consumer's perceptions of what "sustainably produced" food labels imply and estimated the corresponding demand for products carrying these labels. Results suggested that the typical U.S. consumer is not willing to pay a positive premium for beef, toma-toes, or apple products labeled as "sustainably produced." Demand is particularly sensitive to inferences consumers make regarding what a "sustainably produced" food label implies. Jones et al. (2010) also examined consumer WTP for clone-free meat labels. Data were collected at the Sunbelt Agricultural Exposition (Ag Expo) in Moultrie, Georgia, using a consumer self-administered survey instrument. Survey results showed that the majority (59.45%) of the respondents said they were willing to pay for clone-free labels. Bid amount, gender, and education were the factors that influenced WTP for clone-free labels. In addition, Nurse et al. (2010) examined the potential psychological predictors of stated WTP for different sustainable food attributes. Specifically, consumer's attitudes and level of perceived consumers' effectiveness (PCE) were measured to identify and define potential

factors that aid in predicting consumers' WTP for products labeled locally grown, organically grown, or fair trade. The research concluded that there was a significant relationship between PCE and the marginal attribute values of local, organic, and fair trade produces.

In sum, the reviewed articles stressed on the importance of consumer awareness and the demand for food labeling from both marketing and policy perspectives and in both the developed and the developing world. Several research models have been suggested and implemented with some apparent preference to the logit model. Unfortunately, the above issue was not handled in the UAE from either marketing or policy perspectives. This fact in itself justifies the importance of the study in hand, since it could give insight and lead related future research. The results of the study could also aid food-policy makers in the country to make more accurate decisions regarding food-importation policies. It could also identify to marketers what consumers perceive as the most important when to it comes to food labeling.

**MATERIALS AND METHODS**

The United Arab Emirates is a constitutional federation of seven emirates; Abu Dhabi, Dubai, Sharjah, Ajman, Umm al-Qaiwain, Ras al-Khaimah and Fujairah. According to 2011 estimated statistics, the UAE per capita income and population were \$39,623 and 8.26 million, respectively. The UAE nationals accounted for 11.48% or about 948,000 of the population. The majority of population (88.52%) is expatriates from all over the world. The majority of the UAE nationals as well as expatriates reside in Abu Dhabi, Dubai and Sharjah (Mundi, 2012). That is why the three emirates were taken as representative of both nationals and expatriates sample selection of this study. As for sample, the purpose of the paper was to investigate consumers' awareness about food labeling in the UAE. Despite the fact that 88.52% of UAE's population is foreigners; the sample was a little biased towards nationals since most of the affluent foreigners in the UAE come from the Western world. Those Westerns are known to be significantly aware of the importance of food labeling, as indicated in available studies on the issue. The researchers are not aware of any studies on food labeling in the UAE from the nationals perspective. That is why the sample was biased to include nationals as the major domain of consumers in the sample. The respondents were randomly selected and interviewed. A total of 500 questionnaires were conducted via face to face interviews. The number of questionnaires allotted for each Emirate was determined according to its population. The survey included attitudinal questions and elicited economic and demographic information of the respondents. The survey further included questions to identify consumers' awareness and demand for labeling of food items in UAE. The data collectors were trained first, pilot tests were conducted, and then the survey was applied.

In this research, respondents were asked to respond to the statement "A variety of information is provided on food labels. How often do you read food labels?" The response categories were never, rarely, sometimes, and often. In this study, it was aimed to analyze the factors affecting the respondents' attitudes of reading the labels. That is why even if the respondents claimed that they do not read the labels, they would still be within the focus of interest in the study, and consequently they were asked to complete the survey. It is assumed that the alternative answers ( $y$ ) is related to a continuous, latent variable  $y^*$  that indicated a respondent's

frequency of reading food labels. The responses for each statement were taken as the dependent variable in the ordered probit model.

Following Long (1997), the ordered probit model (OPM) can be explained as follows: Before deriving the OPM, a measurement model should be calculated. The measurement model includes a latent variable which can be called  $y^*$ . The variable ranges from  $-\infty$  to  $+\infty$  and mapped over an observed value  $y$ . According to the measurement equation, the variable  $y$  is believed to provide incomplete information about  $y^*$ .

$$y_i = m \text{ if } \tau_{m-1} \leq y_i^* < \tau_m \text{ for } m = 1 \text{ to } J \tag{1}$$

Where the  $\tau$ 's are called the thresholds or cut-points. The observed  $y$  is related to  $y^*$  according to the measurement model. The simple explanation of analysis is as follows:

$$y_i = \begin{cases} 1 \Rightarrow \text{Never} & \text{if } \tau_0 = -\infty \leq y_i^* < \tau_1 \\ 2 \Rightarrow \text{Rarely} & \text{if } \tau_1 \leq y_i^* < \tau_2 \\ 3 \Rightarrow \text{Sometimes} & \text{if } \tau_2 \leq y_i^* < \tau_3 \\ 4 \Rightarrow \text{Often} & \text{if } \tau_3 \leq y_i^* < \tau_4 \end{cases} \tag{2}$$

As done with binary regression models, maximum likelihood estimation can be used to regress  $y^*$  on  $x$ . In OPM, the error term ( $\varepsilon$ ) is distributed normally with mean 0 and variance 1. The pdf for ordered probit model is:

$$\phi(\varepsilon) = \frac{1}{\sqrt{2\pi}} \exp\left(-\frac{\varepsilon^2}{2}\right) \tag{3}$$

And the cdf is:

$$\Phi(\varepsilon) = \int_{-\infty}^{\varepsilon} \frac{1}{\sqrt{2\pi}} \exp\left(-\frac{t^2}{2}\right) dt \tag{4}$$

The probability of any observed outcome  $y = m$  given  $x$  can be calculated by using equation 5. In this equation,  $\beta_0$  or  $\tau$  is constrained to 0 to identify the model.

$$Pr(y_i = m|x_i, \beta, \tau) = F(\tau_m - x_i\beta) - F(\tau_{m-1} - x_i\beta) \tag{5}$$

The probability of observing whatever value of  $y$  was actually observed for the  $i$ th observation is:

$$p_i = \begin{cases} Pr(y_i = 1|x_i, \beta, \tau) & \text{if } y = 1 \\ \vdots & \vdots \\ Pr(y_i = m|x_i, \beta, \tau) & \text{if } y = m \\ \vdots & \vdots \\ Pr(y_i = J|x_i, \beta, \tau) & \text{if } y = J_i \end{cases} \tag{6}$$

If the observations are independent, the likelihood equation is:

**Table 1.** The frequency of reading food labels.

A variety of information is provided on food labels. How often do you read food labels?	Frequency	Percentage
Never	52	10.4
Rarely	119	23.8
Sometimes	221	44.2
Often	108	21.6

**Table 2.** The kind of information that the respondent are looking for on food labels.

Attributes	Always	Sometimes	Rarely	Never
The list of ingredients	40.0	34.2	17.8	8.0
The short phrases on the label like “low-fat” or “light”	33.4	40.2	19.8	6.6
The nutrition panel include the amount of calories, protein, etc.	31.8	31.4	27.4	9.4
The chemical and pesticide information	26.2	35.6	24.2	14.0
The biotechnology information	23.8	32.8	27.2	16.2
The expiration dates	49.4	27.4	16.2	7.0
The country of origin (made in.....)	35.6	35.2	21.8	7.4
The food storage and handling instruction	24.2	33.6	25.6	16.6
The organic seal/certification	24.0	31.6	22.0	22.4

$$L(\beta, \tau|y, X) = \prod_{i=1}^N p_i \tag{7}$$

Combining Equations 5, 6 and 7,

$$L(\beta, \tau|y, X) = \prod_{j=1}^J \prod_{y_i} \Pr(y_i = j|x_i, \beta, \tau) = \prod_{j=1}^J \prod_{y_i=j} [F(\tau_j - x_i\beta) - F(\tau_{j-1} - x_i\beta)] \tag{8}$$

$\prod_{y_i=j}$  indicates multiplying over all cases where  $y$  is observed to equal  $j$ . Taking logs, the log likelihood is:

$$\ln L(\beta, \tau|y, X) = \sum_{j=1}^J \sum_{y_i=j} \ln [F(\tau_j - x_i\beta) - F(\tau_{j-1} - x_i\beta)] \tag{9}$$

Equation 9 can be maximized to estimate the  $\tau$ 's and  $\beta$ 's.

Using these equations, the descriptive statistics of variables used in analysis in this study were provided. Using ordered probit model, the effects of independent variables on the frequency of reading food label were analyzed. The marginal effects of each independent variable were also given. And according to the results of the study, some suggestions were lined up.

## RESULTS AND DISCUSSION

As indicated in Table 1, of the 500 respondents only 10.4% never read food labels. Most of the respondents are reading the labels; that is why the producers/processors should prepare the labels as clear as possible. As shown in Table 2, the respondents are mostly looking to the expiration date of the products on the labels. This is a basic indicator of people’s awareness of negative circumstances which might occur as a result

of consuming outdated products. Supplying fresh products will enhance the success of any food producer. The second important information that the respondents look for is the list of ingredients contained in the food. Since the peoples’ concern of dietary and food in tank is increasing, this was an expected result. In contrast, the less concern seems to be “the food storage and handling instruction” and “the biotechnology information.” Generally, customers are loyal to certain brands and retail stores and they are aware of and trust the way products have been stored and handled. That may explain why they do not concern themselves that much with this issue. As for the biotechnology information, it is hard to understand most of it. Sometimes only experts of the subject can understand the information. Probably the customer’s loyalty and trust of the producers decrease their concern about the issue.

The respondent’s food labeling choices are shown in Table 3. Of the 500 respondents, 21.8% do not know or refused food labeling. Only 7.4% of the respondents indicated that there was no need for food labeling in UAE. The majority were willing to see labels on the food they have been consuming.

### The empirical model

As previously indicated in the methodology section, ordered probit model was implemented. The independent and explanatory variables used in the models are shown in Table 4. Since the frequency of reading food labels

**Table 3.** The respondent's food labeling choices.

Which of the following best describes your attitude regarding the food labeling requirements of the UAE government?	Frequency	Percentage
Do not know / refused	109	21.8
No need for food labeling in the UAE	37	7.4
Only biotechnology information should be noted	74	14.8
All food products should be labeled	279	55.9

**Table 4.** Deterministic statistics of data used in ordered probit model analysis.

Variable	Mean	Std. Dev.	Min.	Max.
LREAD: The frequency of reading food labels (0: never, 1: rarely, 2: sometimes and 3: often)	1.77	0.90	0.00	3.00
GENDER: The gender of respondent (1: male and 0: female)	0.61	0.49	0.00	1.00
AGE: The age of respondents ( 1: ≤17, 2: 18-24, 3: 25-35, 4: 36-45, 5: 46-55, 6: 56-64, and 7: ≥65)	2.99	1.24	0.00	7.00
MSTATUS: Marital status of respondent (1: married, 0: otherwise)	0.42	0.49	0.00	1.00
EDUCAT: Education level of respondent (0: no education, 1: less than high school, 2: high school graduate, 3: college graduate, and 4: post graduate)	2.65	0.84	0.00	4.00
NATIONAL: The nationality of respondent (1: Emirati and 0: otherwise)	0.68	0.47	0.00	1.00
HHSIZE: the household size of respondent (in numbers)	6.76	4.87	0.00	15.00
CHILDR: The number of children aged 18 or younger lives at respondent's home (in numbers)	2.37	1.76	0.00	5.00
INCOME: The respondents monthly household net income in dirham (1: less than 2000, 2: 2000-3999, 3: 4000-5999, 4: 6000-7999, 5: 8000-9999, 6: 10000-11999, 7: 12000-13999, 8: 14000-15999, 9: 16000-17999, 10: 18000-19999, 11: 20000-21999, 12: 22000-23999, 13: 24000-25999, 14: 26000-27999, and 15: 28000 and more)	8.49	4.90	1.00	15.00

(LREAD) had a rank structure, the ordered probit model was the most appropriate model to use. The dependent variable of the model was LREAD and the ranked alternative answers were never, rarely, sometimes, and often. The result of the model is given in Table 5. According to the results, education level (EDUCAT) and the number of children aged 18 or younger living at respondent's home (CHILDR) both have positive influence on LREAD, which was expected. On the other hand, the emirate (NATIONAL) and those who have larger household (HHSIZE) both do not have influence on LREAD. The main reason is that the emirate and those respondents who have larger household size generally have maid and workers who take care of all kinds of shopping.

Meanwhile, there was no prior information about the difference between nationals and non-nationals living in the UAE regarding food shopping habits. It was an implicit goal of the paper to identify the difference between national and non-nationals in term of reading food labels. The results of regression analysis indicated that expatriates were reading food labels more frequently than the UAE nationals. Since older people are more careful about their diet, the influence of age (AGE) on LREAD was expected but it is not significant. Even

though it is not significant, females seem to be reading the food labels more than males, which are again expected as they go more often than males for food shopping. The probabilities and marginal effects of LREAD model are given in Table 6. According to the results, the predicted probability of reading food labels is 98.8%. Based on the marginal effects, female respondents are reading the food labels more frequently than the males. In addition, older people read labels more frequently, but married respondents read less. Educated respondents read labels more frequently but those who have higher income read less frequently. Emirati respondents and those who have larger household read labels less frequently, on the other hand, those who have more children under the age of 18 read labels more frequently.

## Conclusion

Results indicated that the majority of respondents read the information provided on food labels. In addition to that, more than half of them would like to see labeled food items on stores' shelves. Among the attributes written on the labels, the three most important that were checked by respondents were expiration date, list of

**Table 5.** Maximum likelihood estimates of ordered probit model (LREAD).

Variable	Coefficient	t-statistic (asymptotic)
Constant	1.366	5.543***
GENDER	-0.092	-.912
AGE	0.006	.119
MSTATUS	-0.026	-.235
EDUCAT	0.126	2.127**
NATIONAL	-0.273	-2.195**
HHSIZE	-0.033	-2.676***
CHILDR	0.067	2.045**
INCOME	-0.012	-1.119

Log likelihood function: -621.297; Chi squared: 26.325. \*: significant at 0.10 level; \*\*: significant at 0.05 level; \*\*\*: significant at 0.01 level.

**Table 6.** Predicted probabilities and marginal effects from the estimated ordered probit model (LREAD).

Data	Y = 0 Never	Y = 1 Rarely	Y = 2 Sometimes	Y = 3 Often
Predicted probabilities	0.002	0.004	0.988	0.006
<b>Marginal effects</b>				
*GENDER	0.0157	0.0178	-0.0068	-0.0267
AGE	-0.0010	-0.0011	0.0004	0.0016
*MSTATUS	0.0045	0.0050	-0.0020	-0.0075
EDUCAT	-0.0217	-0.0242	0.0097	0.0362
*NATIONAL	0.0444	0.0531	-0.0158	-0.0817
HHSIZE	0.0056	0.0063	-0.0025	-0.0094
CHILDR	-0.0115	-0.0128	0.0052	0.0192
INCOME	0.0021	0.0024	-0.0010	-0.0036

ingredients and the country of origin. The biotechnology information, food storage and handling instructions, and the organic certification were read rarely by the respondents. Furthermore, the older, more educated, and those who have more children under age of 18 read food labels more frequently. On the other hand, most of the respondents want the food items to be labeled mandatorily in UAE.

The identification of how UAE consumers perceive food labeling, whether there are legislation and laws or not, should be of importance to the government and to the people in charge of the food labeling process. This is because labeling food, no matter how accurate it is, will have no significance or value to the consumers if they do not believe in its importance (for example, they buy food from the shelves regardless of whether food is labeled or not). In addition, there is a lot of money spent on legalizing food labels. Probably, it would be helpful to policy makers to devote money to educating the consumers about the importance of labeling food more than just caring for passing laws and legislation and to have them in effect. In other words, the national UAE

consumers are probably just looking for the basic information written on the food labels. And to most of them, food labels simply mean information about the country of origin, ingredients and expiration dates. That is why identifying UAE consumers' awareness about the food labeling issue was of importance in this study to highlight what Emirati consumers perceive the most.

One of the suggestions to policy makers would be to provide education and awareness programs for UAE nationals to read the entire information written on the label. This is because food labeling is not confined to the basic information UAE consumers look at. It is much more than that. It includes information on the existence of hazardous materials, genetically modified ingredients which their hazard is not yet known, having carcinogenic materials, and so on. Policy makers, on the other hand, can benefit from the study results by making laws and legislation regarding the establishment of food labeling in the country. Standardization of the way that labeling should be made has to be set by the government and then food producers/processors should be educated about its importance and implementation. This is

important as the trend now is uprising regarding issues related to food safety, nutrition and quality. And for a country that imports more than 95% of its food needs, a revision of food importing policies should be made with more emphasis on labeling. The hazardous impacts of new technologies adopted in food production/processing are increasing, so is the awareness of consumers worldwide and in the UAE.

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