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IMPACT OF FOOD SAFETY CERTIFICATION AND CERTIFICATION BODIES ON PURCHASING DECISIONS OF LEBANESE CONSUMERS

by
PARDIE SARKIS KARAMANOUKIAN

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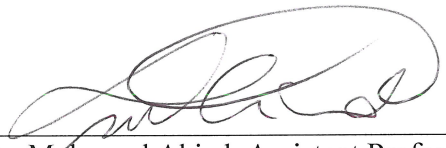

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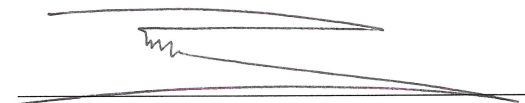

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As food safety scandals increase and consumers' awareness on the subject grows, understanding consumers' purchasing decision for safer food is of high importance for both providers and receivers of such benefits. While asymmetric information leads to market failure, considering consumers' trust in certification source is important for a deeper understanding of faced concerns. As previous studies show Lebanese consumers' interest in certified food, the impact of food safety certification and certification bodies on consumers' purchasing decision is tested using latent class model. Information provision on risk reduction and consumers' trust in certification bodies are investigated in this study.

The results from this study show that Lebanese consumers in general value international and, surprisingly, upgraded MoPH certification over locally sourced certifications schemes. When presented with information regarding quantitative risk reduction effected by the various certification schemes, consumers are able better to comprehend the importance and impact of food safety certification on their food consumption and health, resulting in more realistic WTP estimates.

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ABBREVIATION

ABM	Attribute-Based Methods
AIC	Akaike's Information Criterion
ANA	Attribute Non-Attendance
BIC	Bayesian Information Criteria
CE	Choice Experiments
CL	Conditional Logit
ECLC	Equality-Constrained Latent Class
FAO	Food and Agriculture Organization
GAP	Good Agricultural Practices
HACCPs	Hazard Analysis of Critical Control Points
IC	Information Criteria
IRB	Institution Review Board
ISO	International Organization for Standards
LC	Latent Class
MENA	Middle East and North African
MoET	Ministry of Economy and Trade
MoPH,	Ministry of Public Health
WHO	World Health Organization
WTO	World Trade Organization
WTP	Willingness To Pay

CHAPTER I

INTRODUCTION

Food safety related issues are still a major concern worldwide, in both developed and developing countries due to foodborne diseases which contribute to illness, hospitalization and death (Center of Science in the Public Interest, 2005). Consumers' perception concerning risk of food poisoning as well as their trust in regulations, influence their behavior and purchasing decisions. As consumers' awareness of food safety and quality issues is growing, consequently they are demanding better information.

Different bodies play a role into having a safe food industry (Trienekens & Zuurbier, 2008):

- Global regulations on food safety and quality; particularly the Food and Agriculture Organization (FAO), the World Health Organization (WHO) and the World Trade Organization (WTO)
- National and international legislation on food safety and quality
- Public standards, such as the Eurep-GAP
- Private standards, such as the Good Agricultural Practices (GAP), Hazard Analysis of Critical Control Points (HACCPs) and the International Organization for Standards (ISO)

The main player in this should be the government through food safety laws, regulations, standards and certification schemes. Legislations are laws set by the government, which in itself can include regulations that are rules and procedures to follow. Certifications

are written assurances to which the receiver complies with certain standards, which in general specify product characteristics and ways of production. In order to protect public health, government agencies and institutions should focus on developing, implementing, enforcing and monitoring food safety guidelines and practices. However, in most developing countries, governments face a challenge in proper implementation of food safety standards due to political and economic instability, thus international agencies are needed for technical assistance. National or international organizations, UN agencies, and public institutions can play a role in regaining consumer trust through advertisement, awareness campaigns, food safety education, certifications and standards.

Technical assistance provided to developing countries focuses on different food related activities. International agencies, such as the FAO and WHO, whose assistance in food standards is major, include but is not limited to assistance in preparation of food law and regulations as well as development and strengthening of National Food Safety Programmes (FAO & WHO, 2003). Globalization and multinational food retailers have led food standards to become more international and uniform.

The Lebanese government has shown little interest and follow-up on the implementation of food safety standards. A Food Safety Panel was established in 2001 in collaboration with UNIDO and standards concerning agro-foods and other industrial products are under the authority of LIBNOR, the Lebanese Standards Institution attached to the Ministry of Industry (FAO, 2007). The Ministry of Economy and Trade (MoET) mandated the Lebanese Food Safety Panel to draft the new Lebanese Food Law by 2003 (van der Meulen, 2010). The Food Safety Law draft was prepared by several governmental bodies (Ministry of Public Health - MoPH, Ministry of Agriculture and

MoET), but due to limited coordination among them, the draft has still been waiting to be endorsed by the parliament since 2006 (Chalak L. , 2010).

As such, insufficient governmental control, monitoring and follow-up in the food supply chain has resulted in contentious food related scandal (El Tabch, Abu Dajer, & Chehab, 2012). To mention a few, the usage of expired food products in restaurants and hotels in 2012[1], the discovery of expired and rotten food products in 2012[2], toxic chemicals found in Lebanese olive oil in 2011[3] and long lasting scandals of slaughterhouses[4&5].

The Lebanese MoPH reported more than 1500 cases of food poisoning during the past 5 years (Ministry of Public Health, 2014), noting that official figures concerning food poisoning do not reflect the real severity of the situation, for most cases go unreported. The cases have been detected through its surveillance system from physicians, medical centers, dispensaries, laboratories and hospitals (Ghosn & Saleh, 2010).

In order for producers to keep up with the local demand for safer food, international certifications were introduced in the country offered by local and international bodies.

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[1] NOW: https://now.mmedia.me/lb/en/reportsfeatures/a_rotten_situation

[2] The Daily Star: http://www.dailystar.com.lb/News/Lebanon-News/2012/Mar-30/168471-restaurant-owners-say-recent-spoiled-meat-scare-affected-their-business-reputation.ashx#axzz314Gii9a1

[3] The Daily Star: http://www.dailystar.com.lb/News/Lebanon-News/2011/Mar-21/134801-khalifeh-to-address-complaints-over-toxic-olive-oil-products.ashx#axzz314Gii9a1

[4] http://www.dailystar.com.lb/News/Lebanon-News/2003/May-14/39458-karantina-slaughterhouse-leaves-residents-gasping-for-breath.ashx#axzz314Gii9a1

[5] http://www.dailystar.com.lb/News/Lebanon-News/2013/Dec-21/241879-scenes-of-gore-from-beirut-slaughterhouse.ashx#axzz314Gii9a1

Consequently, the trend for safer food was created in Lebanon during the past years to fill a food safety legislative vacuum.

A large body of literature exists on consumer choice regarding food safety related issues (Grunert, 2005; Dosman, Adamowicz, & Hrudey, 2001; de Jonge, van Trijp, Renes, & Frewer, 2007). However, researchers have not focused on consumer preferences and purchasing decision based on source of certification which in result has different impacts on the reduction of risk of foodborne illness.

Although studies have shown that in general, Lebanese citizens do not trust the government especially when it comes to its intervention in food or environmental related products (United Nations Development Programme, 2012; Chaaban, 2012; Hanna, Karam, & Srour, 2011); little research has been dedicated to consumer preference for various food safety assurance programs. Thus, further research on Lebanese consumers' perception regarding governmental as well as private intervention in food safety related issues is needed for better public intervention policies aimed at restoring consumers' confidence.

Choice experiments (CEs) have gained appeal among researches in the market and consumer research. In general, CE is used in studying consumer preferences, allowing testing consumer valuation of different attributes at different levels given. Recent studies on consumer demand for food related products have implemented the Latent Class (LC) model to better understand consumers' choice patterns by identifying the different consumer groups for a given product (Hu, Hunnemeyer, Veeman, Adamowicz, & Srivastava, 2004; Kikulwe, Birol, Wesseler, & Falck-Zepeda, 2011; Birol, Asare-Marfo, Karandikar, & Roy, 2011). Other studies have used this model to identify

consumer segments regarding food safety (Liljenstolpe, 2011) as well as their attitudes towards certification (Scarpa, Thiene, & Galletto, 2006). In the same context, a study has been done on Chinese consumer preference for food safety attributes on pork consumption, where respondents are segmented into four different classes: "price conscious", "certification conscious", "pork lovers" and "worried consumers" (Ortega, Holly Wang, Wu, & Olynk, 2011). Adopting the LC model, consumer classes and their share of the population is identified and how each class's choice is influenced based on different product attributes.

In previous papers, the impact of food safety related information provision on Lebanese consumers' purchasing decision of shawarma sandwich has already been studied (Chalak & Abiad, 2012; Abiad & Chalak, 2012). The selection of this food item was mainly because first it is considered as a traditional fast food product consumed regularly by the Lebanese people of all ages; second, the majority of shawarma providers are micro businesses and hardly ever take into account safety issues; and finally because none of shawarma providers have food safety certification.

The aim of this study is to investigate the impact that food safety certification source has on consumers' purchasing decision through a CE using LC model. Classification of Lebanese shawarma sandwich consumers into different segments is used as a tool in order to investigate the impact of food safety certifications and certification bodies has on the different segments of the population separately. In addition to the sub-sampling of the population, where one sub-sample is presented with "risk information" and one is not, will highlight the impact of information provision on consumer purchasing decision for the same product with similar attributes. This will assist in better targeting food safety related issues and better implementation of public policy intervention schemes,

be it local, national or international, as well as better marketing strategies. In addition to LC model's contribution to marketing research, by identifying the target consumers interested in safer food practices, will assist the government in identifying target population interested and influenced by safer food practices. This will lead to producers getting certifications depending on their target population, increasing both their and the consumers' surplus in the food chain market.

CHAPTER II

METHODOLOGY

A. The survey

1. Choice experiment

A CE was designed to study the influence of various safety certification schemes, ranging from the local to the internationally-recognized to the governmental on consumers' choice of shawarma sandwiches. In the absence of real market data, choice experiments can be useful in understanding consumers' purchasing behavior as it closely simulates market choice situations. When carefully designed, CEs can yield credible estimates of willingness to pay (WTP) and market share gains for new products, new features in existing products, or changes in the level of provision of one or more attributes of existing products. This has made CEs and related stated preference methods a tool of choice among many marketing researchers and practitioners since the 1960s (Louviere, Hensher, & Swait, 2000, p. 283).

CEs are part of a wider set of stated preference methods known as attribute-based methods (ABMs). In the context of food choice, ABMs present survey respondents with a number of meal or portion attributes (e.g., portion size, safety certification, location) that can be provided at different possible levels. In addition, the costs of the various proposed changes to product attributes are usually proposed by means of changes of a price attribute. Consumers are asked to choose their most preferred product from a set of options differing in terms of their attribute levels as described in choice cards or sets

presented to them. Repeated choices by consumers from a set number of choice cards reveals the trade-offs customers are willing to make between the attributes (Hanley, Mourato, & Wright, 2001). From the resulting choice data, the preference parameters of the various attributes of the good can then be estimated using the appropriate econometric tools, as will be detailed in the next section.

2. Survey design

The survey design was built based on the findings from a focus group conducted for a similar food safety study that was conducted in 2011 (Chalak & Abiad, 2012), and upon which the current study builds. Both studies were based on food safety certification as it shapes shawarma purchasing decisions and both shared the same non-safety attributes. The emphasis of the focus groups was mainly on non-sensory aspects. Though sensory attributes (e.g. taste) were also discussed, it turned out that location/convenience of the food shop or order, the size of the portion and of course price, were the most important non-sensory attributes to consumers and subsequently were included alongside the food safety attributes of interest in this survey design similarly to the previous study. As such, this study treats secondary data.

This choice of attributes was broadly justified by the empirical literature on non-sensory determinants of food choice which was recently reviewed by Jaeger (2006). Among the factors enumerated, convenience as the reduction of time and effort in the meal process is deemed important. Also, price is discussed in its capacity both as an aspect of food to be traded against various qualities of the food product, and as a perceived indicator of quality itself. Personal health is also considered important, and though the focus is on dietary habits and nutritional value, personal health could also be extended to

encompass food safety. Branding is seen as the main motor of business profits, as it plays various important roles for the consumer, among which feature risk reduction and sign of quality. Indeed food safety certificates, often made visible by means of widely recognized labels, could be considered to be a means of achieving brand value.

In order to gauge the additional effect of quantitative risk reduction on the valuation of food safety certification, we adopted a split-sample approach. In this design, choice tasks that were otherwise identical differed in their inclusion, or not, of a quantitative risk reduction attribute alongside the various safety certificates which goal is to affect them. In the first 'without risk information' treatment, the food safety information presented to respondents was only embodied in the safety certification attributes that ranges from the locally offered to the internationally recognized safety certificates. In the second 'with risk information' treatment, respondents also received information on the percent reduction in risk of foodborne illness in the safety-certified sandwiches compared to the uncertified sandwiches.

The final list of attributes is shown in Table 1. The certification attribute described the safety certificate, if any, obtained by the hypothetical vendor serving shawarma, with a focus on the type of certifying body and with all the implications this would have on the degree of rigor in enforcement and monitoring. These bodies varied from (i) local third-party certifying bodies that would provide safety inspection and training services tailored to the needs of the food service, to the (ii) internationally recognized certificates, such as ISO22000, that are more thorough and more directed to food industry establishments, to a (iii) hypothetical MoPH safety certification scheme that goes beyond the mere licensing of food establishments to their regular and mandatory

inspection and monitoring. In addition to certification, the percent reduction in risk of foodborne illness attribute features in choice tasks presented only to a 'with risk information' sub-sample. The reductions in risk accompanying each certificate were expressed as percentages which ranges varied with the type of certification; third-party local bodies being considered less rigorous than either internationally-recognized or MoPH. Both the certification and risk reduction were developed by consulting a food safety and microbiology expert at the American University of Beirut (Zeina Kassaify, personal communication, February 12, 2012).

Table 1 Attributes and attribute levels used in the choice experiment

Attribute	Levels	Description of levels	
Certification	4	1. No certification 2. Third-party local 3. Internationally-recognized 4. Upgraded MoPH	
Location and convenience	4	1. Round the corner (less than 5-minute walk) 2. Within walking distance (more than 5-minute walk) 3. Need to go there by car 4. Delivery order	
Portion size	2	1. Typical small-sized sandwich (approx. 15 cm) 2. Medium-sized sandwich (approx. 25 cm)	
Change in risk of foodborne illness (only in the 'with risk information' treatment)	4	No certification Third-party local Internationally-recognized/Upgraded MoPH	0% No change 0% No change 20% Reduction 35% Reduction 70% Reduction 35% No change 70% Reduction 90% Reduction 99% Reduction
Price increase	6	1. LBP0 2. LBP500 3. LBP1,500 4. LBP2,500 5. LBP4,000 6. LBP6,000	

The location/convenience attribute described the distance to the food shop serving the shawarma product or the way the product is ordered. That is, whether the shop offering the shawarma product is around the corner, within a walking distance of more than five minutes or accessible by car, or whether the product could be ordered by delivery. The portion size attribute contrasted the typically served small-sized sandwiches (approximately 15cm long) to the medium-sized sandwiches that are commonly encountered in many food shops serving shawarma (approximately 25cm long). Finally, price change ranged from no increase to LBP6,000 (USD3.96)[6] increase above the price that each respondent usually pays for a sandwich of shawarma. In comparison, more than 90% of consumers in Greater Beirut typically pay between LBP2,500 (USD1.65) and LBP5,000 (USD3.30) for a small-sized shawarma sandwich, with an average of LBP3,980 (USD2.63), and therefore we have provided for the possibility that some consumers could pay considerably high premiums for safer, closer or more convenient, and/or larger-sized shawarma products[7].

Respondents were presented with a series of choice sets each including four hypothetical shawarma products or options described in terms of their attributes (which included the risk reduction attribute, depending on whether the respondents were randomly allocated to the 'with risk information' treatment). The CE is a labeled CE in that each choice task had all three types of certificates in addition to no certification, whereby the first, second, third and fourth options would have no safety, local third-

[6] LBP stands for Lebanese pound. USD1 = LBP1,515

[7] The mean prices paid for a sandwich in the two sub-samples are virtually equal (LBP3,975 and LBP3,985 for the 'without' and 'with risk information' respondents, respectively).

party, internationally-recognized, and upgraded MoPH certificates, respectively. In addition, an opt-out option ('none of these') was included to avoid forcing respondents to make choices. Lastly, we included a 'cheap talk' script right before the choice tasks to describe the propensity of respondents to inflate their stated WTPs in this type of surveys. Both opt-out options and cheap-talk scripts have been advocated in the stated preference literature as tools to help reduce the problem of hypothetical bias and align stated WTP with 'true' WTP (Hensher, 2010).

The choices that respondents stated in each choice set were the result of trade-offs between attribute and price levels which are systematically varied across options and choice sets. Respondents then had to state which product they would purchase if they had the choice in a real market situation. An example of a choice set used in this study is shown in

.

Figure 1 Example of a choice set

CHOICE CARD 4

	Option 1	**Option 2**	**Option 3**	**Option 4**	
Certification	No certification	Third-party local	Internationally-recognized	Upgraded MoPH	**None of these**
Location and Convenience	Around the corner (less than 5 minutes walk)	Delivery order	Delivery order	Around the corner (less than 5 minutes walk)	
Portion Size	Typical small-sized sandwich (approx. 15 cm)	Medium-sized sandwich (approx. 25cm)	Medium-sized sandwich (approx. 25cm)	Typical small-sized sandwich (approx. 15 cm)	
Change in risk of foodborne illness	0% No change	35% Reduction	90% Reduction	35% Reduction	
Price Increase	LBP1,500	LBP2,500	LBP4,000	LBP6,000	
Please choose the ONE option you prefer most	☐	☐	☐	☐	☐

An experimental design with a Bayesian information structure maximizing a Db-optimal criterion was employed to generate twelve choice sets that were presented to each respondent (Ferrini & Scarpa, 2007). Information from a pilot survey with a main-effects fractional factorial design, conducted earlier with 50 students from the American University of Beirut, Lebanon, were used to optimize the design parameters of the main stage survey.

The survey questionnaire was composed of four sections (see Appendix for a sample of the survey questionnaire). The first included a wide range of background questions covering food safety habits, attitudes, perceptions and knowledge as well as food purchasing behavior. The second section consisted of the choice exercise centered on the twelve choice sets generated by the Db-optimal experimental design as described above. Indeed a preamble explained to respondents how the choice exercise worked, after which respondents went through the choice sets that were followed by debriefing questions gauging the difficulty they experienced and the levels of importance they accorded to each attribute while making their choices. The third section consisted of a short survey on attitudes to bottled water[8], and the fourth and last section collected socio-demographic data on both respondents and their households.

[8] This two-page survey was part of another small study on WTP for 'zero nitrate' labeled bottled water brands in Lebanon, and was embedded in the survey instrument for our food safety study in order to achieve larger sample size for both studies at minimal cost.

3. *Household interviews*

The main stage survey covered Greater Beirut, an area comprising central administrative Beirut; the political and economic capital of Lebanon, and its suburbs located in various contiguous districts of the Mount-Lebanon governorate. The questionnaires were distributed proportionally to the number of registered voters in the areas to be covered. Information International adopted a multi-stage probability sampling to ensure a random, representative sample for the identification of the households and the respondents. The first stage consisted of selecting neighborhoods inside each selected area in a way to represent the make-up of the areas, the second stage consisted of selecting households based on a systematic random sample in each selected neighborhood according to the estimated number of buildings in the neighborhood, and finally the third stage consisted of sampling a primary respondent within each household based on the most recent birthday. The interviewer asked about the total number of adults aged 18-64 years living in the household, and chose the one with the most recent birthday (at the date of the interview) to be the main respondent. If the selected person was not at home, a follow-up up to two times was conducted before declaring a non-response. This method ensured that everyone has an equal chance of inclusion, with no one allowed to self-select into the sample. If the selected respondent accepted to participate in the survey, the respondent was explained the objectives of the survey and the interviewers re-assured the respondent that he questionnaire is voluntary, anonymous and confidential.

This study was approved by the American University Institution Review Board (IRB). In order to ensure the anonymity of the respondents, no personal identifiers (e.g., names,

addresses, and phone numbers) were collected. The study was completely voluntary, and participants were also given the choice to quit at any time, and refrain from answering any question(s). When necessary, items in the questionnaire were explained to ensure accurate responses.

A representative sample of 700 respondents aged 18 to 64 of the Greater Beirut households in addition to some areas in the districts of Chouf, Aley, Baabda and Metn at large was selected for face-to-face home interviews during May and June 11th, 2012. A multi-stage probability sampling was adopted to ensure a random, representative sample for identifying households and main respondents. Those who reported never having purchased shawarma sandwiches for varying reasons (e.g., vegetarian, doesn't like shawarma, doesn't buy food from vendors etc.) were excluded from the analysis (n=103); hence the final sample size for analysis included 597 respondents: 293 in the 'without risk information' and 304 in the 'with risk information' treatments. Characteristics of the overall sample, as well as the treatment sub-samples, are presented in Table 2.

Table 2 Sample characteristics

	Without risk information (n=293)	**With risk information (n=304)**	**Overall without excluded respondents (n=597)**	**Overall sample (n=700)**
Gender				
Male	55.97%	53.62%	54.77%	50.14%
Female	44.03%	46.38%	45.23%	49.86%
Age				
16 - 24 years	19.80%	21.71%	20.77%	22.27%
25 - 39 years	34.13%	35.20%	34.67%	37.44%

≥ 40 years	46.08%	43.09%	44.56%	40.29%
Education				
Elementary (less than high school degree)	20.14%	18.42%	19.26%	18.57%
Secondary/High school (12 years of schooling)	43.00%	38.49%	40.70%	38.57%
Some college (1-3 years of college)	16.04%	22.04%	19.10%	20.43%
University graduate (bachelor degree or equivalent)	17.06%	17.43%	17.25%	18.86%
Postgraduate, master's degree, doctorate	3.75%	3.29%	3.52%	3.29%
Refuse to answer	0.00%	0.33%	0.17%	0.28%
Household income				
< $1,500/month	50.00%	51.19%	50.59%	51%
$1,500 - $2,999/month	31.91%	34.13%	33.00%	31.57%
≥ $3,000/month	3.95%	2.73%	3.35%	5.29%
Don't know/refuse to answer	14.14%	11.95%	13.07%	12.14%
Price typically paid for a shawarma sandwich				
LBP1,500 - LBP3,000	22.53%	21.71%	22.11%	
LBP3,500 - LBP5,000	74.06%	73.36%	73.70%	
LBP5,500+	3.41%	4.93%	4.19%	

B. Discrete choice Model

Different statistical techniques can be used to analyze discrete choices. In this paper, the LC model is used in order to segment consumers into different clusters.

1. Conditional logit model

The conditional logit (CL) is best suitable for behavioral modeling of polychotomous choice situations where the dependent variable has more than two possible values and is mostly used in conjoint analysis. It is based on a model similar to the logistic regressions but the difference is that respondents are faced with different situations before making their choice. As such, individuals will have to choose a product characterized by different attributes with different levels. This concept was first

introduced by McFadden (1974), focusing on the set of alternative for each individual and the explanatory variables as characteristics of these alternatives rather than individual attributes. As such, individual *i* will choose alternative *j* of attribute *x* to maximize utility (U) given by:

$$U_{ij} = x_{ij}\beta + \varepsilon_{ij} \qquad (1)$$

This is derived from a part V_{ij} and a random element ε_{ij}.

The probability (P) for individual *i* to choose alternative *j* is given by:

$$P_{ij} = \frac{e^{x_{ij}\beta}}{\sum_j e^{x_{ij}\beta}} \qquad (2)$$

The log-likelihood (logL) is given by:

$$logL = \sum_{i=1}^{N}\sum_{j=1}^{J} y_{ij} log\left[\frac{e^{(x_{ij}\beta)}}{\sum_{j=1}^{J} e^{(x_{ij}\beta)}}\right] \qquad (3)$$

2. *Latent class logit model*

LC model developed by Lazarsfeld in 1950 (Skrondol & Rabe-Hesketh, 2007) is a useful tool for discrete choice data. It is used in identifying important market segments mainly for marketing and targeting purposes. The model assumes that a given population can be divided into different clusters; grouping together individuals sharing to certain extend similar preferences, interests and values. Each class is independent from the other, and the more the population is segmented the greater number of independent classes can be identified. Each class has a different utility preference. As

such, respondents' behavior can be analyzed per attribute as well as per segment. The LC is derived from the CL except that it is conditional on the class *c*.

The probability π_{nc} of respondent *n* choosing alternative *i* falling in class *c* is given by:

$$P_n\,(i|\beta_1, \ldots., \beta_c) = \sum_{c=1}^{C} \pi_{nc} P_n(i|\beta_c) \qquad (4)$$

Where,

$$P_n(i|\beta_c) = \frac{e^{(\beta_c X_{ni})}}{\sum_{j=1}^{J} e^{(\beta_c X_{nj})}} \qquad (5)$$

There are three issues concerning the LC: determining number of the classes, choosing model fit index and the problem of convergence (Jung & Wickrama, 2008). To determine the number of classes, statistical information criteria (IC) are used. ICs do not indicate a final number of classes for analysis. Two common IC are the Bayesian Information Criteria (BIC) and Akaike's Information Criterion (AIC). The BIC is defined as (Schwarz, 1978):

$$BIC = -2logL + plog(n) \qquad (6)$$

And, AIC (Bozdogan, 1987) as:

$$AIC = -2logL + 2p \qquad (7)$$

Where *p* is the total number of parameters and *n* is the total number of observations. A lower IC (closer to zero) indicates an improvement in the model. As BIC accounts for the sample size, it is more consistent and tends to provide more accurate number of classes as sample size increases, unlike AIC (Tofighi & Enders, 2007).

An extension to the LC can also be conditioned on covariates such as socio-demographics. However, this was not accounted for in this paper in order to study it in more depth in a different paper.

C. Willingness to Pay

Consumer WTP is tested based on consumers' choice for a given product based on the different attributes tested (certification source, decrease in risk of foodborne illness, location and size).

$$WTP_x = -(\beta_x | \beta_{price}) \quad (8)$$

[9] We multiply WTP by 1,000 because the variable Price entered and analyzed was divided by 1,000.

CHAPTER III

RESULTS

A. Consumer preference "without risk information"

To determine the best fitting LC model, AIC and BIC were calculated for both set of respondents, up to 5 segments using NLOGIT (Table 3). A three-class model is used in this research, even though both AIC and BIC keep decreasing, since most of the parameters did not show significance or were exploding at both 4 and 5 class models.

Table 3 Goodness of fit and number of class determination for consumers "without risk" with c=1 to c=5 (n = 3444)

Number of classes	Number of parameter	log-L	log-L (0)	log-L(β)	Pseudo-R^2	AIC	BIC
1	8	-3864.992	-5542.904	-4598.567		7745.98	7795.14
2	17	-3459.433			.3758809	6952.86	7057.32
3	**26**	**-3288.422**			**.4067331**	**6628.84**	**6788.69**
4	39	-3023.668			.4544975	6125.33	6364.96
5	44	-2784.504			.4976454	5657.00	5927.36

Overall, in a three-class model, all consumers positively value certified shawarma sandwiches (Table 4). First category of consumers, comprising around 25% of the population, values international and upgraded MoPH certifications significantly less than the other two classes. But contrary to the others, they value MoPH certification more than international. These consumers are the most affected by price, as such

referred to as "price conscious consumers". In addition to their preference for medium size sandwich, these consumers are mostly influenced by vendor's location, especially locations that require a car.

Class 2 and class 3 consumers are characterized by their high preferences for certifications, especially internationally sourced. Even though class 2 values certifications more than class 3 consumers, the latter are characterized by their low sensitivity to price. We refer to consumers in class 2 as "certification conscious consumers", representing the biggest segment with 42% of the population belonging to it and class 3 as "shawarma lovers" (33%).

Table 4 Latent class analysis for respondents "without information" (c = 3)

Variable	Class 1 "Price Conscious Consumers"		Class 2 "Certification Conscious Consumers"		Class 3 "Shawarma Lovers"	
	Coeff.	SE	Coeff.	SE	Coeff.	SE
Third-party certification	0.174	0.18193	2.943***	0.13428	3.301***	0.13379
Internationally recognized	1.292***	0.18128	4.965***	0.15654	3.896***	0.13415
Upgraded MoPH	1.860***	0.16571	4.283***	0.13913	3.763***	0.13262
Walking distance	-0.659***	0.14677	-0.544***	0.09312	-0.105	0.08412
By car	-1.398***	0.15164	-1.018***	0.10437	-0.364***	0.07220
Delivery order	-0.790***	0.16281	-0.586***	0.11837	-0.018	0.08558
Medium size	0.561***	0.13073	0.564***	0.06808	0.292***	0.05504
Price	-1.178***	0.07543	-1.067***	0.03999	-0.101***	0.01467
Class share	**0.2475*** **		**0.4225*** **		**0.3300*** **	

Significant at $p<0.1$; **significant at $p<0.05$; *** significant at $p<0.01$.

B. Consumer preference "with risk information"

For consumers presented with risk information (Table 5), AIC decreases from class 2 until class 5; BIC decreases till class 4 then increases at 5 segments, indicating that four

segments model is better fit. For comparison purposes among the two sub-samples tested, i.e. in order to evaluate the impact of information provision, three class LC model is considered in this study.

Table 5 Goodness of fit and number of class determination for consumers "with risk" with c=1 to c=5 (n = 3528)

Number of classes	Number of parameters	log-L	log-L (0)	log-L (β)	Pseudo R^2	AIC	BIC
1	11	-3308.9301	-5678.09	-4336.91		6639.86	6707.71
2	23	-2907.6312			.487921	5861.26	6003.13
3	**35**	**-2534.3283**			**.553666**	**5138.65**	**5354.55**
4	47	-2390.9714			.578913	4875.94	5165.86
5	59	-2348.9626			.586311	4815.92	5179.86

*Significant at p<0.1; **significant at p<0.05; *** significant at p<0.01.

The results from the LC analysis for respondents who were introduced with information regarding risk reduction (Table 6) differ greatly from the results of consumers who were only presented with certification sources.

Similar to the first sub-sample, all consumers are negatively affected by the location of the shawarma provider, as it becomes less convenient. Class 3 consumers are the most negatively affected by sale points that require walking, driving or even through a delivery order. The increase in the size of the sandwich positively affects consumers' choices across all classes. As for risk reduction in relation to the source of certification, it is positively valued by all consumers each at a different rate. Class 1 consumers are the most influenced by the reduction in foodborne illness for all three types of certification source, mostly MoPH risk reduction. As such, we refer to this class as the

"worried consumers", representing 48.3% of all consumers. Class 2 consumers are those who in general value certifications with disregard of its impact on safety related issues. As such, we refer to the as "certification conscious consumers", with 21.5% consumers having similar attitude and preference. As for the remaining 30.2% of consumers, they are distinguished by their sensitivity to price ("price conscious consumers").

Table 6 Latent class analysis for respondents "with information" (c = 3)

Variables	**Class 1 "Worried Consumers"**		**Class 2 "Certification Conscious Consumers"**		**Class 3 "Price Conscious Consumers"**	
	Coeff.	SE	Coeff.	SE	Coeff.	SE
Third-party certification	-0.970*	0.67745	2.305***	0.12389	-1.600***	0.32782
Internationally recognized	-2.182***	0.43304	2.935***	0.21524	-1.074***	0.23356
Upgraded MoPH	-3.533***	0.74183	2.062***	0.25293	-0.206	0.39496
Walking distance	-0.181	0.15908	0.002	0.10145	-0.869***	0.11872
By car	-0.605***	0.14848	-0.207***	0.00811	-2.076***	0.14399
Delivery order	-0.225	0.21142	-0.013	0.09915	-1.005***	0.17194
Medium size	0.914***	0.14158	0.258***	0.06592	0.659***	0.09945
Risk reduction x third-party	0.058***	0.01014	0.002	0.00234	0.031***	0.00564
Risk reduction x international	0.091***	0.00545	-0.001	0.00247	0.054***	0.00285
Risk reduction x MoPH	0.104***	0.00905	0.004*	0.00296	0.044***	0.00477
Price	-0.458***	0.03802	-0.243***	0.01477	-1.473***	0.04748
Class share	**0.4827*** **		**0.2147*** **		**0.3026*** **	

*Significant at $p<0.1$; **significant at $p<0.05$; *** significant at $p<0.01$.

C. Consumer WTP

3. Consumer WTP per attribute

Both conditional and unconditional consumer WTP are tested. First we discuss consumer WTP for each attribute, per class per sub-sample.

Respondents who were not presented with "risk information" are willing to pay additional cost for food safety certifications provided by the three certification bodies tested (Table 7). As the name implies, "price conscious consumers" are the least willing to pay any additional cost. They are most likely to pay more for government certified sandwiches by LBP1,580 (USD1.05) over internationally sourced (less by approximately LBP500 – USD0.33). On the other hand, consumers belonging to class 2 are willing to pay LBP2,760 (USD1.8) for locally sourced certification, LBP4,650 (USD3.1) for international and LBP4,015 (USD2.67) for governmental. As for class 3 consumers, they are willing to pay LBP38,340 (USD25.56) for internationally sourced certification and LBP37,035 (USD24.69) for upgrade MoPH certification. As previously mentioned, the high values reported are due to consumers' low sensitivity to price.

Regarding the other attributes tested, all consumers are unwilling to pay any additional cost for any of the location attributes, mostly for stores requiring a car to access. The further the location of the store, the less convenient it is, the less consumers are willing to pay. The WTP for an increase in size of the sandwich is positive across all classes with around LBP500 for 77% of consumers (class 1 and class 2), but much higher for class 3 consumers (LBP2,890).

Table 7 WTP estimates of respondents "without information" in LBP/sandwich

Attributes	Class 1 "Price Conscious Consumers"	Class 2 "Certification Conscious Consumers"	Class 3 "Shawarma Lovers"
Third-party certification	148	2,758***	29,682***
Internationally recognized	1,097***	4,652***	38,336***
Upgraded MoPH	1,579***	4,014***	37,035***
Walking distance	-559***	-510***	-1,038
By car	-1,187***	-955**	-3,584***
Delivery order	-671***	-549***	-179
Medium size	476***	529***	2,883***

*Significant at $p<0.1$; **significant at $p<0.05$; *** significant at $p<0.01$

When consumers are presented with "risk information", their WTP becomes more realistic (Table 8Table 8). Similar to consumers "without risk information", they are unwilling to pay any additional cost for any of the location attributes, mostly to locations that require a car, but willing to pay additional cost for a larger size sandwich by LBP1,998 (USD1.33), LBP1,061 (USD0.71) and LBP447 (USD0.3) respectively reported by class 1, 2 and 3 consumers.

As for risk reduction, class 1 and class 3 consumers are willing to pay additional cost for every percent in risk reduced initiated by food safety certification. Class 1 consumers are characterized by their higher WTP amount compared to class 3 consumers. They are willing the most for an upgraded MoPH certification by LBP227 (USD1.15) per every percent risk of foodborne illness reduced, second highest for internationally sourced certification by LBP199 (USD0.13) for every percent risk reduced and the least for locally source by LBP127 (USD0.08) for every percent risk reduced. On the other hand, class 3 consumers are willing to pay more for international over governmental over third-party certification. Results for class 2 consumers did not show any significance, even at 90% level of confidence.

Table 8 WTP estimates of respondents "with information" in LBP/sandwich

Attributes	Class 1 "Worried Consumers"	Class 2 "Certification Conscious Consumers"	Class 3 "Price Conscious Consumers"
Third-party certification	-2,120*	9,480***	-1,086***
Internationally recognized	-4,768***	12,074***	-729***
Upgraded MoPH	-7,718***	8,481***	-140
Walking distance	-395	10	-590***
By car	-1,323***	-850**	-1,410***
Delivery order	-491	-55	-682***
Meduim size	1,998***	1,061***	447***
Risk reduction x third-party	127***	10	21***
Risk reduction x international	199***	-6	37***
Risk reduction x MoPH	227***	17	30***

*Significant at $p<0.1$; **significant at $p<0.05$; *** significant at $p<0.01$.

4. Consumer WTP per sandwich

Consumers who were not provided with risk information pay LBP3,978 for a typical small size sandwich (15 cm). When presented with the choice of having certified shawarma sandwich, their WTP increases by LBP11,000 (USD7,33) for a typical shawarma sandwich certified by a local body, LBP14,900 (USD9.93) certified by an international certification body and LBP14,310 (USD9.54) for an upgraded certification from MoPH (Table 9). In the same sense, consumers who were presented with "risk information" pay LBP3,988 (USD2.65). But in this case, they are less willing to pay an additional cost for certified shawarma compared to the "without information" sub-sample, with an average of an additional LBP2,080 (USD1.39) for local, LBP6,635 (USD4.42) for upgraded MoPH and LBP7,485 (USD4.99) for international certification. The high WTP of consumers under the first sub-sample could be due to a hypothetical bias as a result of the non-binding nature of the stated purchasing decision, explained by their low sensitivity to the price coefficient. This could also be due to attribute non-attendance (ANA), where respondents have a non-compensatory behavior

between different attributes (Lagarde, 2013). This could be accounted for using the equality-constrained latent class (ECLC) model, by segmenting respondents based on two different utility functions: the zero utility weights for selected attributes and non-zero attribute which are assu `med to take the same value across classes (Scarpa, Gilbride, Campbell, & Hensher, 2009).

This also could be explained by the lack of information regarding the added value (risk reduction) of purchasing a shawarma sandwich with food safety certification, for stated WTP of consumers presented with "risk information" is more realistic.

Table 9 Mean WTP for shawarma sandwiches certified by different bodies

Attribute: Type of certification with different percentage in risk reduction	No Info	With Info
Third-party certification, 20% risk reduction, small size, around the corner	10,999***	2,083***
Internationally recognized certification, 70% risk reduction, small size, around the corner	14,890***	7,483***
Upgraded MoPH certification, 70% risk reduction, small size, around the corner	14,310***	6,634***
Mean price paid for a typical small size sandwich	3,978	3,988

*Significant at $p<0.1$; **significant at $p<0.05$; *** significant at $p<0.01$.

After conducting the LC models for consumers who were presented by the risk information factor, we can calculate its impact on their WTP for a typical shawarma sandwich (medium size shawarma sandwich from a shop located around the corner). The results show that "price conscious consumers" are unwilling to pay a premium for third party certification. On the other hand, they are WTP the highest premium for MoPH upgraded certified shawarma, purchased from around the corner. As for "certification conscious consumers", they are WTP the highest premium for medium

sized, internationally certified shawarma sandwich from vendors accessible on foot (more than five minute walk). It is assumed that "worried consumers" have overstated their WTP for all type of certifications due to a hypothetical bias (see above).

Table 10 WTP for shawarma sandwiches with different levels of attributes for consumers without "risk information"

Certification source	Attributes	Class 1 "Price Conscious Consumers"	Class 2 "Certification Conscious Consumers"	Class 3 "Worried Consumers"
Third-party certification	**1- Around the corner, small size**	148	2,760***	29,680***
	2- Walking distance, medium size	64	2,775***	31,525***
	3- By car, medium size	-565***	2,335***	28,980***
	4- Delivery order, medium size	-47	2,740***	32,385***
International certification	**1- Around the corner, small size**	1,095***	4,650***	38,335***
	2- Walking distance, medium size	1,015***	4,670***	40,180***
	3- By car, medium size	385**	4,235***	37,635***
	4- Delivery order, medium size	900***	4,630***	41,040***
Upgraded MoPH	**1- Around the corner, small size**	1,580***	4,015***	37,035***
	2- Walking distance, medium size	1,495***	4,035***	38,880***
	3- By car, medium size	870***	3,590***	36,335***
	4- Delivery order, medium size	1,385***	3,995***	39,740***
Mean price paid for a typical small size sandwich			**3,975**	

*Significant at $p<0.1$; **significant at $p<0.05$; *** significant at $p<0.01$.

Consumers presented with information regarding reduction of foodborne illness had different willingness to pay for certified shawarma (Table 11). Class 1 consumers were willing to pay the lowest premium for the third party certifications with a 20% in reduction of risk and highest for internationally certified medium size sandwiches from

a shop accessible on foot (more than five minute walk) providing 70% risk reduction assurance.

On the other hand, class 2 consumers are willing to pay an additional cost for all types of certifications with the maximum being for internationally certified medium size sandwiches from a walking distance shop. Class 3 consumers are not willing to pay any additional cost for local certification with the assumed risk reduction, but are willing to pay the most for a small size internationally certified sandwich from around the corner an additional of LBP1,860 (USD1.24) for and an additional of LBP100 (USD0.07) for a similar sandwich certified by MoPH.

Table 11 WTP for shawarma sandwiches with different levels of attributes for consumers presented with "risk information"

Certification source	Attributes	Class 1 " Worried Consumers"	Class 2 "Certification Conscious Consumers"	Class 3 "Price Conscious Consumers"
Third-party certification	**1- 20% risk reduction, around the corner, small size**	430	9,680***	-670***
	2- 20% risk reduction, walking distance, medium size	2,030**	10,750***	-810***
	3- 20% risk reduction, by car, medium size	1,100	9,890***	-1,630***
	4- 20% risk reduction, delivery order, medium size	1,935*	10,685***	-900***
International certification	**1- 70% risk reduction, around the corner, small size**	9,160***	11,640***	1,860***
	2- 70% risk reduction, , walking distance, medium size	10,760***	12,700***	1,715***
	3- 70% risk reduction, by car, medium size	9,840***	11,850***	895***
	4- 70% risk reduction, delivery order,	10,670***	12,645***	1,620***

	medium size			
Upgraded MoPH certification	**1- 70% risk reduction, around the corner, small size**	8,222***	9,655***	1,960***
	2- 70% risk reduction, , walking distance, medium size	9,825***	10,725***	1,815***
	3- 70% risk reduction, by car, medium size	8,900***	9,865***	1,000***
	4- 70% risk reduction, delivery order, medium size	9,730***	10,660***	1,725***
Mean price paid for a typical small size sandwich			**3,985**	

*Significant at $p<0.1$; **significant at $p<0.05$; *** significant at $p<0.01$.

CHAPTER IV

CONCLUSION

This study, being a continuation of previous works conducted on consumer perception and purchasing decisions concerning food safety certification in Lebanon, has shown new results that are relevant to the entire Middle East and North African region (MENA). The implications of this study can be projected to the MENA region as well as developing countries where shawarma sandwiches are consumed as cultural fast food products and where the food safety guidelines and its implementations are limited.

Overall, the results from this study show that consumers generally value certified food. By having two different sub-samples, we were able to understand the impact of information provision on consumers purchasing practices for certified food.

As previously stated this study has two main objectives; in shaping better marketing and in initiating guidance to better public policy strategies. Concerning market targeting, first, shawarma providers should be located in popular streets, accessible by a large number of prospective consumers. Second, a medium sandwich size option should be available for it is demanded by all consumers. And third, delivery option should be free of charge for consumers are unwilling to pay additional cost for this service. On the public policy end, it is evident that consumers favor certified food and are willing to pay for it. The overall finding show that consumers prefer internationally sourced certification scheme and surprisingly upgraded MoPH certification over local third-party certification.

The overall findings of the study could be translated into the real market by providing consumers with accurate information on different types of certifications and sources, as well as standards and guidelines. When consumers are presented with information regarding risk reduction, they were able to understand the importance of a food safety certification scheme and how it would impact their food consumption and health. This has assisted consumers in understanding the value added from such an attribute and in return state more realistic WTP amounts. Segmenting consumers into different preference groups assists producers to identify the type of certification and at which levels is demanded at different extents.

With information provision enforced, the Lebanese government through the MoPH would increase the demand for local food products and improve competitiveness of the Lebanese local food production market, in order to maintain the trust of the consumers which had been previously lost due to daily food related scandals.

National policies should be directed into encouraging international certification bodies into providing food suppliers with food safety certification schemes, especially to local fast food chains. Moreover, the government should work on upgrading the already existing standards and provide national certifications; for consumers seem to trust the government in providing safer food standards.

Lastly, further research should be conducted to identify the socioeconomic attributes of consumers who value international certifications over MoPH for better targeting strategies.

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Appendix

Questionnaire Version 1A

SECTION 1: BACKGROUND QUESTIONS

1) **How likely do you think it is for people in Lebanon to get food poisoned from eating outside their homes (restaurants, snacks…) compared to food prepared at home?**
    1. Much less likely
    2. Less likely
    3. About as likely
    4. More likely
    5. Much more likely
    99. Don't know

2) **In your opinion, how serious is contamination of food with micro-organisms such as bacteria:**
    1. Not serious at all
    2. Not very serious
    3. Neutral/Undecided
    4. Somehow serious
    5. Very serious
    99. Don't know

3) **How important do you think hygiene and safety are in food?**
    1. Not Important at all
    2. Not very important
    3. Neutral/Undecided
    4. Somehow important
    5. Very important
    99. Don’t know

4) **How do you usually prefer eating your steak?**

1. Rare (cold red center; soft)
2. Medium rare (warm red center; firmer)
3. Medium (pink and firm)
4. Medium well (small amount of pink in center; firm)
5. Well done (gray-brown throughout; firm)
6. I don't eat steaks

99. Don't know

5) How likely do you think that you will get food poisoned?

1. Never
2. Rarely
3. Every once in a while
4. Sometimes
5. Almost always

99. Don't know

6) How do you think chicken can be made safe if it has salmonella in it? (CIRCLE ALL THAT APPLY)

1. By cooking it
2. By washing it
3. By freezing it
4. By adding vinegar or lemon juice to it
5. Cannot be made safe

99. Don't know

7) How much do you agree with each of the below statements? Circle the most appropriate answer; scores range from 1-5? (1 is "Strongly Disagree" to 5 "Strongly Agree")

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Don't know
a) I know how to cook food safely	1	2	3	4	5	99
b) I am confident that the food I buy at the grocery store is safe	1	2	3	4	5	99
c) I am confident that the food I eat at restaurants is safe	1	2	3	4	5	99

d) Luck plays a big part in how likely I am to get food poisoning	1	2	3	4	5	99
e) I think that the government is doing enough to prevent food contamination	1	2	3	4	5	99
f) Organic foods are less likely to be contaminated than non-organic foods	1	2	3	4	5	99
g) I think that food manufacturers are doing enough to prevent food contamination	1	2	3	4	5	99
h) More expensive the food is safer	1	2	3	4	5	99

8) Have you ever heard of the following potential causes of food problems?

	No	Yes	Don't know
a) Salmonella	1	2	99
b) Listeria	1	2	99
c) Campylobacter	1	2	99
d) E. coli	1	2	99
e) Hepatitis A	1	2	99

9) In the past 12 months, have you gotten any food safety information, such as information on food handling from any of the following sources?

	No	Yes	Don't know
a) TV and radio news	1	2	99
b) Internet news sites	1	2	99
c) Newspapers	1	2	99
d) Friends and family	1	2	99
e) Doctors or other health care providers	1	2	99
f) Teacher, instructor or professor	1	2	99
g) Internet sites such as blogs, Facebook, or Twitter	1	2	99
h) Government websites	1	2	99

10) How likely are you to try a new restaurant?

1. Never
2. Rarely
3. Every once in a while
4. Sometimes
5. Almost Always

99. Don't know

11) Has any TV show, newspaper or other source of information recently changed your perception regarding certain foods?

1. No
2. Yes

99. Don't know

12) Has any TV show, newspaper or other source of information recently changed your perception regarding certain food vendors?

1. No
2. Yes

13) Which type of media do you think could be the most effective when it comes to food safety campaigns?

1. Radio
2. TV
3. Newspapers/Magazines
4. Social Media (Facebook, Twitter etc.)
5. Billboards

99. Don't Know

14) In the past 6 months, how often did you eat each of the following foods?

	Never	Once a month	Once a week	2-4 times per week	More than 4 times a week	Don't know
a) Raw meat (Kibbe, liver, Frakeh, etc.)	1	2	3	4	5	99
b) Sushi or any other raw fish	1	2	3	4	5	99

c) Eggs with runny yolks, soft scrambled eggs, or soft meringue	1	2	3	4	5	99
d) Homemade frosting with raw egg	1	2	3	4	5	99
e) Homemade Mayonnaise	1	2	3	4	5	99
f) Chicken shawarma	1	2	3	4	5	99
g) Lamb/beef shawarma	1	2	3	4	5	99
h) Qashta based sweets	1	2	3	4	5	99
i) Fresh cheese made from unpasteurized milk (e.g. Brie, Camembert, Chèvre, Blue cheese)	1	2	3	4	5	99

15) How serious do you think food scares are in Lebanon?

1. Not serious at all
2. Not really serious
3. Undecided
4. Somewhat serious
5. Very serious

99. Don't know

16) How likely are you to visit a restaurant if one of your friends or family members has told you that he/she was poisoned after having eaten there?

1. Never
2. Rarely
3. Every once in a while
4. Sometimes
5. Almost Always

99. Don't know

17) How much do you agree with each of the below statements? Circle the most appropriate answer; scores range from 1 to 5 (1 is "I totally disagree" to 5 "Totally Agree")?

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Don't know

a) Known/highly advertized food brands/ restaurants are usually safer.	1	2	3	4	5	99
b) Pre-packaged foods/pre-cooked meals are usually safer.	1	2	3	4	5	99
c) It is expensive to apply food safety measures	1	2	3	4	5	99

18) How often do you purchase shawarma?

1. Never
2. Rarely (Once a month) (SKIP Q19)
3. Sometimes (1-4 times/month) (SKIP Q19)
4. Often (more than 4 times/month) (SKIP Q19)
5. Daily (SKIP Q19)
6. Don't know

19) Why? (PROCEED TO SOCIODEMOGRAPHICS SECTION)

1. I don't like shawarma
2. I am a vegetarian
3. I am a vegan
4. I am allergic
5. Other; specify _____

20) What kind of shawarma do you usually purchase?

1. Chicken
2. Beef/Lamb
3. Both

21) Which type of shawarma do you think is most likely to cause food poisoning?

1. Chicken
2. Beef/Lamb
3. Both

99. Don't know

22) How much do you usually pay for your shawarma sandwich (approx. 15 cm)?

1. Less than LBP500
2. LBP500
3. LBP750
4. LBP1,000
5. LBP1,500
6. LBP2,000
7. LBP2,500
8. LBP3,000
9. LBP3,500
10. LBP4,000
11. LBP4,500
12. LBP5,000
13. LBP5,500
14. LBP6,000
15. LBP6,500
16. LBP7,000
17. LBP7,500
18. LBP8,000
19. More than LBP8,000

99. Don’t know

23) Who do you think is more likely to get food poisoning? (CIRCLE ALL THAT APPLY)

1. Infants
2. Children
3. Pregnant women
4. Elderly people
5. People with certain illnesses
6. Immuno-compromised people
7. People who eat risky foods
8. Teen/young adults

99. Don't know

24) In the past year, who of the following, if any, had any kind of sickness that you thought might have been caused by eating spoiled or unsafe food?

1. Myself
2. Sibling
3. Parent
4. Relative
5. Friend
6. No one I know

25) Did the person poisoned see a doctor or get hospitalized for this illness?

1. No
2. Yes

99. Don’t know

26) Did the person poisoned skip work or was obliged to stay home after being food poisoned?

1. No (SKIP Q27)
2. Yes

99. Don’t know (SKIP Q27)

27) How many working days did the person poisoned skip?

1. |_____| days

99. Don’t know

28) Which of the following do you think are symptoms of food poisoning?

	No	Yes	Don't know
a) Fever	1	2	99
b) Edema	1	2	99
c) Nausea and Vomiting	1	2	99
d) Runny nose	1	2	99
e) Diarrhea	1	2	99
f) Temporary loss of sight	1	2	99
g) Abdominal pain	1	2	99
h) Coughing	1	2	99
i) Hypertension	1	2	99

SECTION 2: CHOICE EXERCISE

Most food services in Lebanon (e.g. food vendors, restaurants, fast food shops etc…) are not safety-certified. This means that their food handling practices are not regularly monitored to ensure their safety by respectable certifying bodies, whether public or private. Currently, the Ministry of Public Health (MoPH) is the governmental body in charge of ensuring the safety of food establishments in Lebanon. Moreover, the Ministry of Economy and Trade' Consumer Protection Directorate in principle should regularly inspect those places once operational to ensure conformity to safety norms and standards. In practice, the only practical governmental intervention is to license food services at the time of their establishment, without regular follow-up safety inspections.

It is reported by the MoPH that an average of 400 individuals per year are hospitalized throughout Lebanon due to foodborne illnesses. Of those, ten are reported to die. However, this is likely to be an under-estimate of the scale of the problem since many food-related illnesses go unnoticed, confused with other conditions (e.g. flu), or considered too mild to be reported or hospitalized. In Lebanon, not all food poisoning cases are being reported as is the case in the USA or other developed countries.

Recently, many food service establishments have sought safety certification from various private organizations, be they local or international. Moreover, recent media coverage of food scares in the fruit, vegetable and meat market in Lebanon has highlighted the need to improve public enforcement and monitoring of the safety of food establishments in the country.

In the next few questions, we will present a series of possible shawarma products that may or may not be certified following one of the below safety certification and inspection schemes:

Local Third-Party	Various food services in Lebanon are seeking certification from local third-party private companies (e.g. Boecker, GWR) or NGO's (LAFS). Such certifying bodies could offer a range of services such as hygiene, cleanliness and safety trainings for food handlers as well as hygiene and safety inspections tailored to the needs of the food service.
Internationally Recognized	Such types of certification usually follow internationally-recognized food safety standards that are usually very thorough and more directed to the food industry (e.g. ISO22000, HACCP). Yet many food service establishments in Lebanon, including restaurant chains, seek them especially when aiming to expand regionally or globally. They set standard management requirements for food safety to decrease the likelihood of food poisoning. Such certifications require periodic review and monitoring by internationally accredited third-party companies.
Upgraded MoPH	In addition to the MoPH's mandate to license food establishments, we want you to imagine a scenario where the MoPH upgrades its service to include mandatory and regular safety and hygiene inspections of food service establishments that would comply with the same internationally-recognized standards observed by certification schemes like ISO22000.

In addition to certification, each listed product will be described in terms of the following four attributes which can have various levels (GO THROUGH ATTRIBUTES AND LEVELS)::

Attribute	Possible levels
Location and convenience	• Around the corner (less than 5-minute walk) • Within walking distance (more than 5-minute walk) • Car drive away • Delivery option
Portion size	• Small-sized sandwich (approx. 15cm) • Medium-sized sandwich (approx. 25cm)
Change in risk of foodborne illness	• % reduction (compared to product labeled 'No certification')
Price increase	• LBP/sandwich

As the attributes' levels change, the price of shawarma might increase <u>as compared to the price at which you usually purchase your sandwich</u>.

In the next few questions you will be asked to state your preferences with respect to changes in attributes related to shawarma. The proposed attributes will be bundled together in the form of hypothetical products, like this one (SHOW AN EXAMPLE COLUMN OF A CHOICE CARD)

	Option 2
Certification	Third-party local
Location and Convenience	Around the corner (less than 5-minute walk)
Portion Size	Medium-sized sandwich (approx. 25cm)
Change in risk of foodborne illness	70% Reduction
Price Increase	LBP 500

This hypothetical shawarma product has a third-party local safety certificate. The food outlet serving this is round the corner, within a 5-minute walking distance. It is a medium-sized sandwich (around 25 cm). The product is 70% less likely to cause a foodborne illness compared to the 'No certification' product. Finally, the price of the sandwich will increase by LBP 500 over the price that you usually pay as you have previously indicated in question 22.

The next few questions will show you four hypothetical products that differ in terms of the previously mentioned attributes, like this one (SHOW FIRST CHOICE CARD):

CHOICE CARD 1

	Option 1	**Option 2**	**Option 3**	**Option 4**	
Certification	No certification	Third-party local	Internationally-recognized	Upgraded MoPH	**None of these**
Location and Convenience	Delivery order	Around the corner (less than 5-minute walk)	Within walking distance (more than 5-minute walk)	Around the corner (less than 5-minute walk)	
Portion Size	Typical small-sized sandwich (approx. 15 cm)	Medium-sized sandwich (approx. 25cm)	Medium-sized sandwich (approx. 25cm)	Medium-sized sandwich (approx. 25cm)	
Change in risk of foodborne illness	0% No change	70% Reduction	90% Reduction	70% Reduction	
Price Increase	LBP 500	LBP 500	LBP 1,500	LBP 1,500	
Please choose the ONE option you prefer most	□	□	□	□	□

All you have to do is to consider these options and select the one you prefer most, or indeed choose none if you are not satisfied with any of them or think they are too expensive for to what they offer.

Before you start, we want you to help with a problem we face in such studies. Experience from similar surveys shows that people often tend to respond one way but act differently at the point of sale. It is very common for survey respondents to state a higher willingness to pay for such food products than what they'd actually pay in the food outlet. This is often due to not considering how big an impact an extra cost actually has on the family budget. It is easy to be generous when one does not really have to make the choices at the point of sale. However, if no attention is paid to the actual costs, our measure of the value to consumers of safety-certified foods will be overestimated. Please help us measure your preferences correctly by considering actual prices of the various food products presented to you before deciding which one you prefer.

So let's start off then by considering the choice we looked at and find out which of these options you would prefer to have (RE-PRESENT 1ST CHOICE CARD):

CHOICE CARD 1

	Option 1	**Option 2**	**Option 3**	**Option 4**	
Certification	No certification	Third-party local	Internationally-recognized	Upgraded MoPH	
Location and Convenience	Delivery order	Around the corner (less than 5 minutes walk)	Within walking distance (more than 5 minutes walk)	Around the corner (less than 5 minutes walk)	
Portion Size	Typical small-sized sandwich (approx. 15 cm)	Medium-sized sandwich (approx. 25cm)	Medium-sized sandwich (approx. 25cm)	Medium-sized sandwich (approx. 25cm)	**None of these**
Change in risk of foodborne illness	0% No change	70% Reduction	90% Reduction	70% Reduction	
Price Increase	LBP 500	LBP 500	LBP 1,500	LBP 1,500	
Please choose the ONE option you prefer most	☐	☐	☐	☐	☐

CHOICE CARD 2

	Option 1	**Option 2**	**Option 3**	**Option 4**	
Certification	No certification	Third-party local	Internationally-recognized	Upgraded MoPH	**None of these**
Location and Convenience	Around the corner (less than 5 minutes walk)	Need to go there by car	Need to go there by car	Around the corner (less than 5 minutes walk)	
Portion Size	Medium-sized sandwich (approx. 25cm)	Typical small-sized sandwich (approx. 15 cm)	Typical small-sized sandwich (approx. 15 cm)	Typical small-sized sandwich (approx. 15 cm)	
Change in risk of foodborne illness	0% No change	0% No change	99% Reduction	35% Reduction	
Price Increase	LBP 6,000	LBP 4,000	LBP 500	LBP 2,500	
Please choose the ONE option you prefer most	☐	☐	☐	☐	☐

CHOICE CARD 3

	Option 1	**Option 2**	**Option 3**	**Option 4**	
Certification	No certification	Third-party local	Internationally-recognized	Upgraded MoPH	**None of these**
Location and Convenience	Need to go there by car	Around the corner (less than 5 minutes walk)	Need to go there by car	Need to go there by car	
Portion Size	Medium-sized sandwich (approx. 25cm)	Medium-sized sandwich (approx. 25cm)	Typical small-sized sandwich (approx. 15 cm)	Typical small-sized sandwich (approx. 15 cm)	
Change in risk of foodborne illness	0% No change	35% Reduction	70% Reduction	99% Reduction	
Price Increase	LBP 1,500	LBP 6,000	LBP 6,000	LBP 0	
Please choose the ONE option you prefer most	☐	☐	☐	☐	☐

CHOICE CARD 4

	Option 1	**Option 2**	**Option 3**	**Option 4**	
Certification	No certification	Third-party local	Internationally-recognized	Upgraded MoPH	**None of these**
Location and Convenience	Around the corner (less than 5 minutes walk)	Delivery order	Delivery order	Around the corner (less than 5 minutes walk)	
Portion Size	Typical small-sized sandwich (approx. 15 cm)	Medium-sized sandwich (approx. 25cm)	Medium-sized sandwich (approx. 25cm)	Typical small-sized sandwich (approx. 15 cm)	
Change in risk of foodborne illness	0% No change	35% Reduction	90% Reduction	35% Reduction	
Price Increase	LBP 1,500	LBP 2,500	LBP 4,000	LBP 6,000	
Please choose the ONE option you prefer most	☐	☐	☐	☐	☐

CHOICE CARD 5

	Option 1	**Option 2**	**Option 3**	**Option 4**	
Certification	No certification	Third-party local	Internationally-recognized	Upgraded MoPH	**None of these**
Location and Convenience	Within walking distance (more than 5 minutes walk)	Need to go there by car	Within walking distance (more than 5 minutes walk)	Need to go there by car	
Portion Size	Medium-sized sandwich (approx. 25cm)	Medium-sized sandwich (approx. 25cm)	Medium-sized sandwich (approx. 25cm)	Typical small-sized sandwich (approx. 15 cm)	
Change in risk of foodborne illness	0% No change	20% Reduction	70% Reduction	99% Reduction	
Price Increase	LBP 0	LBP 2,500	LBP 6,000	LBP 4,000	
Please choose the ONE option you prefer most	☐	☐	☐	☐	☐

CHOICE CARD 6

	Option 1	**Option 2**	**Option 3**	**Option 4**	
Certification	No certification	Third-party local	Internationally-recognized	Upgraded MoPH	
Location and Convenience	Around the corner (less than 5 minutes walk)	Within walking distance (more than 5 minutes walk)	Delivery order	Need to go there by car	
Portion Size	Typical small-sized sandwich (approx. 15 cm)	Typical small-sized sandwich (approx. 15 cm)	Medium-sized sandwich (approx. 25cm)	Medium-sized sandwich (approx. 25cm)	**None of these**
Change in risk of foodborne illness	0% No change	20% Reduction	90% Reduction	70% Reduction	
Price Increase	LBP 6,000	LBP 6,000	LBP 0	LBP 1,500	
Please choose the ONE option you prefer most	☐	☐	☐	☐	☐

CHOICE CARD 7

	Option 1	**Option 2**	**Option 3**	**Option 4**	
Certification	No certification	Third-party local	Internationally-recognized	Upgraded MoPH	
Location and Convenience	Need to go there by car	Delivery order	Around the corner (less than 5 minutes walk)	Within walking distance (more than 5 minutes walk)	
Portion Size	Medium-sized sandwich (approx. 25cm)	Typical small-sized sandwich (approx. 15 cm)	Medium-sized sandwich (approx. 25cm)	Typical small-sized sandwich (approx. 15 cm)	**None of these**
Change in risk of foodborne illness	0% No change	0% No change	99% Reduction	35% Reduction	
Price Increase	LBP 500	LBP 2,500	LBP 2,500	LBP 500	
Please choose the ONE option you prefer most	☐	☐	☐	☐	☐

CHOICE CARD 8

	Option 1	**Option 2**	**Option 3**	**Option 4**	
Certification	No certification	Third-party local	Internationally-recognized	Upgraded MoPH	**None of these**
Location and Convenience	Around the corner (less than 5 minutes walk)	Delivery order	Within walking distance (more than 5 minutes walk)	Delivery order	
Portion Size	Medium-sized sandwich (approx. 25cm)	Typical small-sized sandwich (approx. 15 cm)	Typical small-sized sandwich (approx. 15 cm)	Typical small-sized sandwich (approx. 15 cm)	
Change in risk of foodborne illness	0% No change	35% Reduction	35% Reduction	99% Reduction	
Price Increase	LBP 6,000	LBP 0	LBP 4,000	LBP 0	
Please choose the ONE option you prefer most	☐	☐	☐	☐	☐

CHOICE CARD 9

	Option 1	**Option 2**	**Option 3**	**Option 4**	
Certification	No certification	Third-party local	Internationally-recognized	Upgraded MoPH	**None of these**
Location and Convenience	Need to go there by car	Need to go there by car	Around the corner (less than 5 minutes walk)	Within walking distance (more than 5 minutes walk)	
Portion Size	Typical small-sized sandwich (approx. 15 cm)	Medium-sized sandwich (approx. 25cm)	Typical small-sized sandwich (approx. 15 cm)	Medium-sized sandwich (approx. 25cm)	
Change in risk of foodborne illness	0% No change	70% Reduction	35% Reduction	35% Reduction	
Price Increase	LBP 0	LBP 4,000	LBP 1,500	LBP 4,000	
Please choose the ONE option you prefer most	☐	☐	☐	☐	☐

CHOICE CARD 10

	Option 1	Option 2	Option 3	Option 4	
Certification	No certification	Third-party local	Internationally-recognized	Upgraded MoPH	
Location and Convenience	Around the corner (less than 5 minutes walk)	Within walking distance (more than 5 minutes walk)	Around the corner (less than 5 minutes walk)	Within walking distance (more than 5 minutes walk)	
Portion Size	Typical small-sized sandwich (approx. 15 cm)	Medium-sized sandwich (approx. 25cm)	Typical small-sized sandwich (approx. 15 cm)	Medium-sized sandwich (approx. 25cm)	**None of these**
Change in risk of foodborne illness	0% No change	20% Reduction	70% Reduction	90% Reduction	
Price Increase	LBP 4,000	LBP 1,500	LBP 4,000	LBP 1,500	
Please choose the ONE option you prefer most	☐	☐	☐	☐	☐

CHOICE CARD 11

	Option 1	Option 2	Option 3	Option 4	
Certification	No certification	Third-party local	Internationally-recognized	Upgraded MoPH	
Location and Convenience	Within walking distance (more than 5 minutes walk)	Need to go there by car	Around the corner (less than 5 minutes walk)	Need to go there by car	
Portion Size	Typical small-sized sandwich (approx. 15 cm)	Medium-sized sandwich (approx. 25cm)	Medium-sized sandwich (approx. 25cm)	Typical small-sized sandwich (approx. 15 cm)	**None of these**
Change in risk of foodborne illness	0% No change	70% Reduction	90% Reduction	90% Reduction	
Price Increase	LBP 2,500	LBP 0	LBP 500	LBP 0	
Please choose the ONE option you prefer most	☐	☐	☐	☐	☐

CHOICE CARD 12

	Option 1	**Option 2**	**Option 3**	**Option 4**	
Certification	No certification	Third-party local	Internationally-recognized	Upgraded MoPH	
Location and Convenience	Within walking distance (more than 5 minutes walk)	Around the corner (less than 5 minutes walk)	Delivery order	Need to go there by car	
Portion Size	Medium-sized sandwich (approx. 25cm)	Typical small-sized sandwich (approx. 15 cm)	Medium-sized sandwich (approx. 25cm)	Medium-sized sandwich (approx. 25cm)	**None of these**
Change in risk of foodborne illness	0% No change	20% Reduction	35% Reduction	90% Reduction	
Price Increase	LBP 2,500	LBP 500	LBP 0	LBP 6,000	
Please choose the ONE option you prefer most	☐	☐	☐	☐	☐

29) You were informed above that according to MoPH, around 10 people are <u>reported</u> to die every year due to foodborne illnesses. Approximately, what would the magnitude of the <u>actual</u> number of deaths be like compared to this number?

1. Lower
2. The same
3. 10 times higher
4. 100 times higher
5. 1,000 times higher
6. 10,000 times higher
7. More than 10,000 times higher

99. Don't know

30) Thinking about all the different attributes of the shawarma sandwich, indicate for each whether or not you have taken it into consideration while making your choices.

Attribute	No	Yes	Don't know
Certification	1	2	99

Location and convenience	1	2	99
Portion size	1	2	99
Change in risk of foodborne illness	1	2	99
Price increase	1	2	99

31) Thinking about all the different attributes of the shawarma sandwich, how would you rank each of the following in terms of importance during your decision making? (Ranks range from 1 (most important) to 5 (least important))

Attribute	Ranking
Certification	|___|
Location and convenience	|___|
Portion size	|___|
Change in risk of foodborne illness	|___|
Price increase	|___|

SECTION 3: BOTTLED WATER SURVEY

32) Have you recently bought a 0.5L bottle of water?

1. No
2. Yes
99. Don't know

33) What is the typical price of an individual 0.5L bottle of water?

LBP |_____|

Typically, it is sold at (SHOW PRICE ON SEPARATE SHOWCARD)

34) Are you aware of the availability in the market of a major bottled water brand labeled "Zero Nitrate"?

1. No (SKIP Q35)
2. Yes
99. Don't know

35) Do you remember which brand?

1. Aliya
2. Nada

3. Nestle
4. Rim
5. Sabil
6. Sannine
7. Sohat
8. Tannourine
9. Other: _____

99. Don't know

36) To the best of your knowledge, what are some of the health risks associated with nitrates in water? (CHOOSE ALL THAT APPLY)

1. No health risks
2. Low O_2 levels in body organs
3. Diabetes
4. Blue baby syndrome in infants
5. Flu
6. AIDS
7. Asthma
8. Cancer
9. Heart attack

99. Don't know

37) Suppose you wanted to buy 5×0.5L bottles of water from a grocery shop. Typically, they would cost LBP2,500 (5×LBP500). Suppose that the shop also offers exactly the same bottled water (i.e. same brand, packaging, color etc…) that differs only in that it has a label claiming "Zero Nitrate". Which bottles would you buy?

1. Regular (SKIP Q38)
2. 'Zero nitrate'

99. Don't know (SKIP Q38)

38) How much would you be willing to pay for your bottles?

1. LBP2,500 (same as regular)
2. LBP2,750 (5xLBP550)
3. LBP3,000 (5xLBP600)
4. LBP3,250 (5xLBP650)

5. LBP3,500 (5xLBP700)
6. LBP3,750 (5xLBP750)
7. LBP4,000 (5xLBP800)
8. LBP4,250 (5xLBP850)
9. LBP4,500 (5xLBP900)
10. LBP4,750 (5xLBP950)
11. LBP5,000 (5xLBP1,000)
12. More than LBP5,000

39) Recent research conducted at AUB has indicated that none of the major bottled water brands in Lebanon is totally free of nitrates, though all these brands are well below the safety limit. In light of this information, which type of bottled water would you now buy?

1. Regular (SKIP TO SOCIO-DEMOGRAPHICS SECTION)
2. 'Zero nitrate'
99. Don't know

40) How much would you be willing to pay for your bottles?

1. LBP2,500 (same as regular)
2. LBP2,750 (5xLBP550)
3. LBP3,000 (5xLBP600)
4. LBP3,250 (5xLBP650)
5. LBP3,500 (5xLBP700)
6. LBP3,750 (5xLBP750)
7. LBP4,000 (5xLBP800)
8. LBP4,250 (5xLBP850)
9. LBP4,500 (5xLBP900)
10. LBP4,750 (5xLBP950)
11. LBP5,000 (5xLBP1,000)
12. More than LBP5,000

SECTION 4: SOCIO-DEMOGRAPHICS

41) Gender

1. Male
2. Female

42) Marital status

1. Single
2. Married
3. Widowed
4. Divorced
5. Separated

43) How many people, including yourself and the domestic helper(s), live in your household?

	Number of people
Total	|____|
Children younger than 5 years old	|____|
Children younger than 5 years old?	|____|
Adults 60 years of age or older	|____|

44) What year were you born?

\|_____\|

45) Is anyone in your household pregnant?

1. No
2. Yes, myself
3. Yes, my partner
4. Yes, someone else
5. Refuse to answer

46) Are you a primary income earner in your household?

1. No
2. Yes
3. Joint income earner

47) What is the last grade or year of school that you have completed?

1. Elementary (Less than high school degree)
2. Secondary/High school (12 years of schooling)
3. Some college (1-3 years college)
4. University graduate (bachelor degree or equivalent)
5. Postgraduate, master's degree, doctorate
6. Refuse to answer

48) What is your current working status?

1. Work full-time (>30hrs/wk)
2. Work part-time (9-29 hrs/wk)
3. Employed, but temporarily not working
4. Looking for work
5. Working, but not for pay
6. Unemployed and not looking for work
7. Retired
8. Refuse to answer

49) What religious beliefs do you most relate to you?

1. Muslim
2. Christian
3. Druze
4. Other; specify _____
5. Refuse to answer

50) Approximately, what is your total household income per month?

1. $0-$499
2. $500-$999
3. $1,000-$1,499
4. $1,500-$1,999
5. $2,000-$2,499
6. $2,500-$2,999
7. $3,000-$3,499
8. $3,500-$3,999
9. $4,000-$4,499
10. $4,500-$4,999
11. $5,000 or more
12. Refuse to answer
13. Don’t know

That was the last question. Thank you for your help in this research!