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### BACKGROUND

Food choice behavior is affected by a variety of stimuli and attributes, making food choice a complex process. More importance is usually given to factors that have little or no relevance while ignoring those that in reality pose a substantial threat to safety.

Though consumers value safer food, most are unaware of proper practices to avoid foodborne illnesses. Millions of people around the globe are hospitalized and even die every year from foodborne diseases and illnesses caused by the consumption of contaminated food. The limited public authority or ministerial oversight over food handling practices and hygiene in some countries in the MENA Region exacerbates the issue

Consumer preferences for healthy food products can grow with the presence of proper information provision coupled with third-party food certification schemes. If such schemes are to affect consumers' choice of food, it is essential to optimize the information provision process be it in the form of awareness campaigns, advertising or labeling, in order to maximize consumer surplus extraction. An in-depth understanding of the potential influences of information provision on consumers' food purchasing decisions becomes of paramount importance.

The stated preference and nonmarket valuation literature is replete with studies examining the impact of varying degrees of information provision on preferences and willingness-to-pay. However, literature on food safety has rarely addressed the influence of food safety information provision on consumers' food purchasing decisions.

Existing literature focused on the effects of information provision on preference means; that is, on systematic shifts in average preferences upon exposure to information.

However, to the best of our knowledge, there is virtually no investigation of the determinants of differential responses to such information, and much less on its impacts on safety and non-safety attribute variances where mixed logit analysis is employed to recover preference heterogeneity.

### **OBJECTIVES**

- . Examine determinants of preferences and purchasing behavior governing food safety certification among Shawarma consumers in Beirut, Lebanon, using a choice experiment.
- 2. Explore the systematic shifts in average preferences for food safety certification upon exposure to information about safety certification schemes.
- 3. Explore the differential and distributional impact on individual attributes' variances.

Minimum Akaike (AIC) and minimum Bayesian information criteria (BIC) were used to assess model specifications.

Price was treated as continuous while dummy variables for remaining attributes' levels were created, leaving out 'round the corner', 'none' and 'typical small-sized sandwich' as reference levels for the location/convenience, certification and portion size attributes, respectively.

The best Model was the hierarchical Bayes Mixed Logit model with interaction terms and correlation (model 5) as it accounts for:

1. Price and attributes preferences 2. Mean effects of information on food safety certification preferences 3. Heterogeneity of attributes and interaction terms

# FOOD CHOICE & SAFETY CERTIFICATION: A MIXED LOGIT INVESTIGATION OF THE SYSTEMATIC, DISTRIBUTIONAL & DIFFERENTIAL INFLUENCES OF INFORMATION PROVISION

### Ali Chalak<sup>1</sup> and Mohamad Abiad<sup>2</sup>

# METHODOLOGY

A choice experiment was designed to study the influence of quality management and safety certification on consumers' choice of shawarma sandwiches.

In the survey, respondents were presented with meal or portion attributes and a price attribute and were 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 revealed the trade-offs customers are willing to make between the attributes. Preference parameters of the various attributes were then estimated.

The survey questionnaire was composed of three sections:

**1** St section aimed at screening out respondents who do not eat shawarma and gauging food safety attitudes, perceptions and knowledge as well as food purchasing habits.

2<sup>nd</sup> section contained the core choice exercise centered on the twelve choice sets generated by an  $D_{b}$ -optimal experimental design.

3<sup>rd</sup> section socio-demographic data on both respondents and their households were collected.

Location and convenie	nce (less
Certification	(5
Portion size	Mediur (ar
Price increase	

Two identical versions of the survey were developed except for the fact that in the second section of Version 2, the choice exercise preamble included, in addition to an explanation of how the choice exercise worked, an extra narrative briefly describing each type of certification that Version 1 did not.

One quality management certification (ISO 9001) and two safety related certifications (ISO 22000 and ServSafe) all of which represent mutually exclusive areas of management and food safety were included in the choice experiment. Moreover, the inclusion of a no certification option provided a realistic anchor that reflects the actual status of virtually all food vendors in Lebanon. Against this anchor preferences for the various certificates under consideration could be estimated.

A Mixed Logit model with correlation across preferences was used since it captures taste heterogeneity and helps establish systematic and differential effects.

5 sequentially nested choice models were estimated which allowed to conduct likelihood ratio specification tests of adjacent models.

4. Correlation across price, attributes and interaction terms

### Attribute MXLP Random parameters - mean<sup>a</sup> Price (LBP'500s) Walking distance -0.194 -1.823Delivery Order -0.440 **ISO 9001** 4.481 ISO 22000 4.999 ServSafe 4.522 Large size Information\*ISO 9002 Information\*ISO 22000 Information\*ServSafe Parameters are non-random in the CL model:

SYSTEMATIC EFFECTS

random in all models except MXLP inf cor; deviations constructed from estimated Choles

### DISTRIBUTIONAL EFFEC



CHOICE CARD 5			Attribute
Option 1	Option 2	Option 3	
nd the corner han 5 minutes walk)	Within walking distance (more than 5 minutes walk)	Delivery order	Location/ convenience Certification
ervSafe	<b>150</b> 22000	<b>150</b> 22000	Portion size
n-sized sandwich prox. 25cm)	Typical small-sized sandwich (approx. 15 cm)	Typical small-sized sandwich (approx. 15 cm)	Price increase
3000 L.L.	3000 L.L.	2000 L.L.	
			SECTION 2: C
han 5 minutes walk) <b>FrySafe</b> n-sized sandwich prox. 25cm) 3000 L.L.	(more than 5 minutes walk) 22000 Typical small-sized sandwich (approx. 15 cm) 3000 L.L.	Delivery order 22000 Typical small-sized sandwich (approx. 15 cm) 2000 L.L.	Certification Portion size



## RESULTS

				ISO 9001		ISO 22000		ServSafe	
(-1.68)	Variables	Levels	N -	$\frac{100}{\text{Mean}(\beta_n)}$	t-ratio	$\frac{1002}{\text{Mean}(\beta_n)}$	t-ratio	$\frac{\text{Mean}(\beta_n)}{\text{Mean}(\beta_n)}$	) t-:
(-10.45)	Sociodemographics		70	0.601		1 (02		1 477	
(2.24)	Gender	Male Female	73 72	0.621 0.616	0.05	1.683	-2.17**	1.477	-2.
(-3.24)	Age	$\leq$ 30 years	66	0.678	0.95	2.189	1 72*	2.162	1
(12.38)	Education	> 30 years	79 37	0.569	0.95	1.753	1.72	1.693	-
(12.48)	Education	University degree	108	0.538	0.60	1.977	-0.12	2.013	C
(10.44)	Work status	Other	110	0.638	-0.65	1.907	0.65	1.647	2.1
(10.44)	Primary or joint income earner	Full or part-time employed	35	0.560		2.090		2.721	
(6.96)	Frimary of joint income earner	Yes	07 78	0.526	-1.56	1.980	0.21	2.003	3.2
(1.75)	Household income	< \$1,500/month	60	0.740	1.60	1.803	1 1 1	1.415	n
(1.75)		$\geq$ \$1,500/month	83	0.552	1.00	2.085	-1.11	2.268	-2.
(4.62)	Attribute importance to choice	Not important/Don't know	76	0.663		2 315		2 236	
(2,71)	Locuiton convenience	Very important/Vital	69	0.570	0.82	1.551	3.12***	1.543	1
(5.71)	Food Certification	Not important/Don't know	27	0.096	-3 91***	0.517	-4 68***	0.143	-4 4
Price non-		Very important/Vital	118	0.739	5.71	2.279	1.00	2.310	
Stop dord	Portion Size	Not important/Don't know Very important/Vital	103 42	0.667	1.35	2.229	3.59***	2.322	3.8
Standard	Price	Not important/Don't know	111	0.609	- <b>-</b> -	2.123		2.217	
ki matrix in		Very important/Vital	34	0.653	-0.37	1.389	2.85***	0.893	3.3
	Food safety perceptions and knowledge		~ •	0.477		1 60 7		0.004	
<b>ATA</b>	Food safety knowledge index (14 questions; +1 pt. if right answer: -1 pt. if wrong: 0 pt. if don't know)	< +4 pts. $> \pm 4$ pts	65 80	0.677	0.90	1.605	-2.49**	. 0.884	-5.0
CIS	Do you consider more expensive food safer?	No/Don't know	113	0.595		2.232	1 0 <b>-</b> 1	2.118	
		Yes	32	0.704	-0.85	1.551	1.87*	1.161	2.
	Food poisoning is not a big threat to my health	Disagree/Neutral/Don't know	124	0.639	0.78	2.088	3.01***	2.070	2.
D 9001	Food sofety attitudes and preventive behavior	Agree	21	0.502		1.140		0.943	
	I don't mind getting food poisoned as long as I enjoy my	Disagree/Neutral/Don't know	130	0.656		2.129		2.134	
d), ∞HML1, //	meal	Agree	15	0.295	1.38	0.406	3.75***	-0.066	4.9
	I am concerned about food poisoning but I'm not taking	Disagree/Neutral/Don't know	98	0.640	0.51	2.168	2.53**	2.280	2.9
	any preventive measures	Agree	47	0.575	0101	1.498	2100	1.128	,
	I am concerned about food poisoning, and I'm acting in ways to avoid it	Disagree/Neutral/Don't know	14 131	0.082	-3.01***	0.589	-3.54***	0.423	-2.
	Purchasing habits	ngice	131	0.070		2.077		2.005	
41. 0. 1. 2. 3. 4.	How often do you purchase shawarma	Less than once per month	65	0.515	-1.65	2.100	1.06	2.384	2
Preference		Once per month or more	80	0.703	1.05	1.830	1.00	1.518	2.
o /	What kind of shawarma do you usually purchase?	Beet/Lamb Chicken or all three kinds	49 96	0.641	0.28	1.509	-2.56**	1.097	-3.0
rvSate	How much do you usually pay for a shawarma sandwich?	<lbp5.000< td=""><td>128</td><td>0.590</td><td></td><td>2.025</td><td></td><td>2.320</td><td></td></lbp5.000<>	128	0.590		2.025		2.320	
		≥ LBP5,000	17	0.834	-1.46	1.398	2.16**	0.364	4.8



### CONCLUSIONS

This study aims to open up new avenues in food safety marketing research in the MENA Region and other less developed countries where food safety considerations are seldom implemented and consumers are rarely aware of them, let alone have established and well informed market demand for them.

The socio-demographically heterogeneous sample of respondents, and idiosyncratic consumer characteristics, have demonstrated how food safety demand would shift in the presence of information provision that mimics in certain ways the impact of awareness campaigns and advertising.

Food safety information provision has influenced the directly relevant attributes by increasing their variances, while causing the opposite to happen in price.

Results offer some useful leads to the behavioral underpinnings of consumer food safety attitudes and purchasing decisions.

While preference formation is problematic in the context of stated preference survey design forming preferences is a central aim for advertising and publicity campaigns.

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# **FURTHER INFORMATION**

Please contact ac22@aub.edu.lb for more information.