The gender role on moderator effect of food safety label between perceived quality and risk on fresh vegetables

El rol del género sobre el efecto moderador de una etiqueta de inocuidad alimentaria entre la calidad y riesgo percibido en vegetales frescos

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ABSTRACT

The role of food safety label in fresh vegetables has received little attention in developing economies and less attention from the perspective of gender. In this context, a conceptual model was developed to explain the effect of food safety label as a moderator variable of risk perception and quality perceived for fresh vegetables from the perspective of gender. A structural equation model was developed in central and south central Chile, using a convenience sample (n = 1114) of vegetables buyers. The main finding of the study was that for females, the food safety label moderated the effect of risk perception on perceived quality; while for males this effect was not significant. However, given that females are primarily responsible for purchasing food, food safety labels are a tool for consumers to recognize unsafe vegetables; at the same time, it can influence the purchase decision of those consumers worried by certain risks associated with fresh vegetables.

Keywords
food safety • structural equation model • risk perception • fresh vegetables • moderator variable

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Resumen

El rol de la etiqueta de inocuidad alimentaria en hortalizas frescas ha recibido poca atención en economías en desarrollo y menos atención desde la perspectiva del género. En este contexto, se desarrolló un modelo conceptual para explicar el efecto de la etiqueta de inocuidad alimentaria como una variable moderadora de la percepción de riesgo y la calidad percibida para hortalizas frescas desde la perspectiva del género. Se desarrolló un modelo de ecuaciones estructurales en el centro y sur de Chile central, utilizando una muestra por conveniencia (n = 1114) de compradores de hortalizas. El principal hallazgo del estudio fue que para las mujeres la etiqueta de inocuidad alimentaria moderó el efecto de la percepción de riesgo sobre la calidad percibida; mientras que para los hombres este efecto no fue significativo. Sin embargo, dado que las mujeres son las principales responsables de la compra de alimentos, las etiquetas de inocuidad alimentaria son una herramienta para que estos consumidores reconozcan las hortalizas riesgosas; al mismo tiempo, puede influir en la decisión de compra de aquellos consumidores preocupados por ciertos riesgos asociados con las hortalizas frescas.

Palabras clave

inocuidad alimentaria • modelo de ecuaciones estructurales • percepción de riesgo • hortalizas frescas • variable moderadora

Introduction

The labeling of food products is a mechanism to reduce information asymmetry between consumers and trade agents of the supply chain (25, 36). In this context, the food safety label for fresh vegetables attempts to inform consumers of production processes; particularly highlighting that produce complies with good agricultural practice (GAP), without the risks associated with microorganisms, or presence of pesticide and technological hazards (2, 56).

However, the food safety label for fresh vegetables is not frequently used, especially in South America where traditional markets account for 70% of vegetable sales, while modern markets comprise the remaining 30%. Traditional markets (municipal food markets and small greengrocers) do not require GAP certification protocols (as promoted by the Chilean Government since the 1990s) or sanitarian resolutions from vegetable producers and/or wholesalers. In contrast, modern markets (supermarkets) meet most international quality standards (20, 34, 51). Although consumption of fresh vegetables is healthy for consumers, this food source does not escape common food safety problems affecting health.

Food safety is related to the perceived quality of fresh vegetables, however risks related with these types of products is a latent dimension. This context is especially relevant for traditional markets, in spite of wide scientific evidence of risks connected to fresh vegetables.

The risks, quality and functionality associated with food safety labels on fresh vegetables are not perceived the same by females and males (58, 63). Based on prior evidence, this research aimed to analyze

the role of gender on the moderator effect of food safety labels in the relationship between perceived quality and risk perception of fresh vegetables.

Conceptual model and research hypotheses

A conceptual model was developed with the objective of explaining the effect of food safety labels on fresh vegetables and associated perceptions of quality and risk (figure 1). This model is based on the Consumer Theory by Lancaster (1966) and contributions of Grunert (2005); Olson and Jacoby (1972); Snoj *et al.* (2004); van Rijswijk and Frewer (2008); Yeung *et al.* (2010) and Zeithaml (1988).

Intrinsic and extrinsic cues on vegetables as components of perceived quality

The concept of quality is defined as consumer judgment of a product's overall excellence or superiority (39, 62).
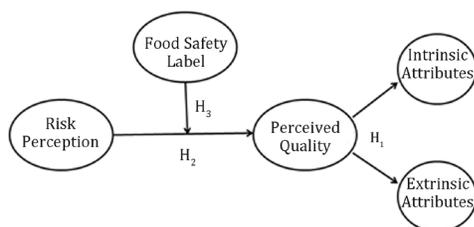

Figure 1. Conceptual model of food safety label for fresh vegetables as moderator of the effect of risk perception on perceived quality.

Figura 1. Modelo conceptual del etiquetado de inocuidad alimentaria para vegetales frescos como moderador del efecto de la percepción del riesgo sobre la calidad percibida.

In addition, Grunert (2005) defined food safety as the opposite concept of food risk, and defined it as the probability of not contracting a disease as a consequence of consuming a certain food. According to Röhr *et al.* (2005) the terms food quality and food safety were used synonymously until the 1990s. It was observed that the concept of food safety was not communicated to the consumers. At the same time, Grunert (2005) stated that food safety could be another dimension of quality that influences the purchasing decisions of consumers. This idea is expanded by van Rijswijk and Frewer (2008) who stated that food quality and food safety are interlinked, but consumers pay more attention to food quality at the time of purchase.

In light of this definition, different studies have also defined food safety as an attribute of implicit credibility in the marketed product where quality cannot be evaluated in the short term; even after the product was purchased and consumed, such as in the application of pesticides, long-term effects can be observed (6, 7, 8, 30).

On the other hand, the perceived quality has been dichotomized into intrinsic and extrinsic cues (21, 38, 62).

Intrinsic cues are derived from the physical composition of the product and cannot be altered without changing the nature of the product itself. Extrinsic cues are outside the product and they differ from the product itself, but are strongly associated with it. For example, the intrinsic attributes are represented by both nutritive and organoleptic properties (color, size and other physical elements), and the extrinsic cues of traditional agrifood products are represented by information, label, brand, social image, packaging, etc. Different authors have shown that perceived quality of food product is composed by intrinsic

and extrinsic attributes, especially for food product with low value-added such as fruits, ham, meat, and tomatoes (19, 21, 32, 35).

Nevertheless, it is important to highlight that the intrinsic and extrinsic attributes help to consumer to make food choice. The intrinsic and extrinsic attributes to form the perceived quality can be deduced at the purchase place, during the consumption and others are of trust (32).

Hypotheses

H1. Intrinsic and extrinsic attributes for fresh vegetables explain the perceived quality in consumers

Consumer perceived risk associated with vegetables

Most consumers are not concerned with food safety in a normal situation. However, this changes when some type of incident occurs that affects food safety and causes consumer concern and anxiety (54). For this reason, consumer perceived risk and its impact on buying behavior is a critical management component of food safety (61).

Furthermore, food choice is often influenced more by psychological interpretation of product properties than by physical properties (59). From the perspective of food safety, Barrena *et al.* (2003) defined consumer perceived risk as concern caused by uncertainties regarding insalubrious foods on health.

On the other hand, the World Health Organization (WHO) (2017) recommends consuming at least 400 grams of fruit and vegetables per day. Beneficial effects notwithstanding, there also exist health hazards associated with food produce, such as foodborne diseases (40). As certain vegetables are consumed uncooked, consumers run risks such as

infection via microbiological contamination (mainly *Salmonella spp.*, *E. Coli* and norovirus), toxic residues exposure (pesticides and fertilizers) and exposure to potential technological hazards such as genetically modified organisms and nanomaterials (11, 29, 52, 59).

If consumers perceive a latent risk to their health as a result of the foods they are purchasing, they will react by reducing, postponing, or even avoiding purchasing that food product. On the contrary, if consumers perceive that the product is safe for their health, they will purchase it (61). Therefore, risk perception in one way or another affects perceived quality of the purchased product.

As a consequence of the above evidence, can be inferred that the perceived quality of fresh vegetables is related to consumer perceived risk. According to this, the following hypothesis is proposed:

H2. Consumer perceived risk affects perceived quality of fresh vegetables

Moderator effect of food safety label for fresh vegetables

Food safety certification of vegetables is an attribute valued by consumers (3). In that sense, was based on Lancaster's theory of consumer demand to explain the moderator effect of food safety label. According to this theory (utility theory), when consumers buy products, they are purchasing utility (benefits) and disutility (sacrifices), provided by the combination of a bundle of attributes (benefits) less the cost or sacrifice associated with the products (28). In this scenario, the intrinsic and extrinsic attributes that compound the perceived quality are the benefits sought by consumers and the costs or sacrifices are the risks associated with the products.

In addition, information economics theory states that products convey three types of cues: search cues, experience cues and credence cues with different levels of abstraction towards consumers (37).

Based on the latter theory, the food safety label as certification labels (for example GAP protocols) can be used to correct asymmetries of information between supply chain and consumers, and to transform credence attributes (food safety label) into search attributes (25).

Hence, based on these theories it is possible to establish sequences of relationships among perceived quality (formed by intrinsic and extrinsic attributes), risk perception (as the opposite concept of food safety) of fresh vegetables, and food safety label as moderator of the effect of risk perception on perceived quality. Therefore, it is proposed to test the following hypothesis:

H3. The food safety label moderates the effect of risk perception on perceived quality.

Importance of gender in food safety choice
Based on cognitive consumer behavior models, gender influences food safety choice. Chambers *et al.* (2008), highlight that consumer motivations for healthy eating are diverse in terms of gender. Worsley *et al.* (2013), reported significant difference between genders and food safety concern. For example, Zorba and Kaptan (2011), found that women are more careful during shopping and more interested in food safety than men. Along this line, Moerbeek and Casimir (2005) found that women are less accepting of foods with technological hazards, such as gene modifications. Furthermore, men consume more risky food compared to women from the perspective of food safety (14).

Therefore, it is hypothesized that:

H4. The gender affects the relationship among risk perception, food safety label and perceived quality.

MATERIALS AND METHOD

Sample and procedure
This study was conducted in the Metropolitan (33°26' S, 70°39' W), Maule (35°25' S, 71°40' W.), and Araucanía (38°45' S, 73°03' W) Regions of Chile.

The study used a convenience sample of vegetables purchasers. A total of 1,201 (400 from Metropolitan, 401 from Maule and 400 from Araucanía) selected consumers over 18 years of age were interviewed in September-November 2012, using a face to face interview.

The amount of outlier values found in the complete dataset required the application of Mahalanobis distance.

Following Byrne (2010), it was deleted these cases in order to continue with analysis.

Finally, the sample used in the study was of 374 respondents for Metropolitan Region, 377 for Maule Region and 363 for the Araucania Region. In the three regions, the number of cases is adequate as it exceeds 200 cases (26). The data were collected by interviews conducted in public places close to banks, stores and supermarkets, following the mall intercept technique.

Data collection instrument
The concept of food safety has not yet been internalized in Chile. Further, consumers have the habit of purchasing fresh vegetables through traditional channels such as municipal markets and greengrocers, where retailers are not required to certify their products with good agricultural practices and protocols.

This means that consumers generally buy fresh vegetables guided by price and external attributes (1).

Therefore, it was structured a closed-answer questionnaire to achieve the objective of the study. The questionnaire was validated through a preliminary test with 10% of the sample.

The survey instrument was based on previous literature related to perceived quality (dichotomous classification into intrinsic and extrinsic attributes), risk perception and opinions towards food safety label on fresh vegetables.

The measure of intrinsic attributes was based on prior studies of Barrena and Sánchez (2010); Martínez-Carrasco *et al*. (2012); Verbeke *et al*. (2008).

The items used were: the aroma is important in vegetables; the size is important in vegetables; the color is important in vegetables; the homogeneity is important in vegetables. Extrinsic attributes were adapted from measures contained in Barrena and Sánchez (2010); Barrena *et al*. (2003); Hodgkins *et al*. (2012); Verbeke *et al*. (2008) and Yeung *et al*. (2010).

The items used were: To what extend do you agree that you use vegetables for their nutritional content?; To what extend do you agree that you use vegetables for their nutritional labeling?; To what extend do you agree that you use vegetables food safety label? Risk perception measures were based on previous literature towards food products and statements were adapted from measures contained in Brewer and Prestat (2002); Tucker *et al*. (2006) and Yeung and Morris (2006).

The variables used for this construct were: I would like that vegetables don't have pesticide residuals; I would like that vegetables are not grown with contaminated water; I would like that vegetables are not contaminated with microorganisms. Opinions towards food safety label on fresh vegetables were measured using an adaptation of the measures contained in Angulo and Gil (2007) and Barrena and Sánchez (2006).

The variables used for this dimension were: A food safety label gives me credibility on the safety of the vegetables; A Food safety label on vegetable makes me think that the product has better quality; I am willing to pay for food safety label on vegetables. All questions about intrinsic and extrinsic attributes, risk perception and the opinions to food safety label were measured on a 5-level of importance, where 1 = minimum importance level and 5 = maximum importance level. Finally sociodemographic variables were included in the questionnaire.

Analytical procedure

The data collected in each region were analyzed by descriptive and inferential statistic (more details in table 1, page 99). Next, following the contributions by Byrne (2010); Hair *et al*. (1999) and Kline (2011) it was developed a structural equation model, in which it was first performed a confirmatory factor analysis to identify the measurement model for each region. The results relate observed indicators with both the exogenous constructs and with endogenous constructs, respectively. Subsequently, the invariance analysis across groups comparison among regions was performed.

Finally, it was defined the structural model for whole sample divided by gender to determine the food safety label as moderator of the effect of risk perception on perceived quality.

The main reason to divide the whole population by gender was that in Chile the purchase of food are mainly decided by women (42, 43). The analysis was performed with AMOS 20 and IBM SPSS 20.

Table 1. Demographic characterization of sample (n = 1114).

Tabla 1. Caracterización sociodemográfica de la muestra (n = 1114).

Sample	Category	Regions (%)		
		Metropolitana (n = 374)	Maule (n = 377)	Araucanía (n = 363)
Gender			p = 0.04	
	Male	33.7	26.3	33.6
	Female	66.3	73.7	66.4
Age			p = 0.00	
	< 35 years old	38.5	59.7	47.1
	35 - 54 years old	44.1	30.8	39.1
	55 years or more	17.4	9.5	13.8
Education			p = 0.00	
	Elementary	1.9	11.4	3.9
	High School	36.4	29.7	30.6
	Incomplete technical college	2.4	3.7	1.1
	Complete technical college or incomplete university	47.9	40.3	54.0
	Complete university or more	11.5	14.9	10.5
Family Income			p = 0.00	
	< US$1,400	45.7	22.5	59.8
	US$1,401 to US$3,700	36.7	58.4	38.0
	> US$ 3,700	17.6	19.1	2.2
Occupation			p = 0.00	
	Housewife	15.2	17.5	13.2
	Employee	64.2	60.2	76.0
	Retired	4.0	2.4	2.8
	Student	16.6	19.9	8.0
Family group			p = 0.00	
	Family with 1-2 members	15.5	18.6	38.3
	Family with 3-4 members	58.8	57.3	51.8
	Family with 5 or more members	25.7	24.1	9.9
Food safety knowledge			p = 0.00	
	Low food safety knowledge	36.1	26.3	34.4
	Middle food safety knowledge	45.7	63.7	49.0
	High food safety knowledge	18.2	10.1	16.5
Frequency of consumption			p = 0.00	
	Eats vegetables occasionally	5.3	1.9	9.4
	Eats vegetables one time in a week	6.1	4.5	16.5
	Eats vegetables three time in a week	33.7	27.6	51.5
	Eats vegetables daily	54.8	66.0	22.6
Vegetable's place of purchase			p = 0.00	
	Supermarkets	39.6	18.0	32.5
	Municipal markets	55.9	31.8	24.0
	Greengrocers'	4.5	50.1	43.5

Results

Sample characteristics

The majority of consumers interviewed were women, and more than 80% of the sample in the three regions was under 55 years of age. More than 40% stated they had completed technical college.

The majority of the sample earned, as a household (family group), less than US$3,700 per month and were employees, entrepreneurs or self-employed. More than 50% were a member of a family of 3 to 4 people. Between 45% and 63% considered they had medium food safety knowledge. Between 22% and 66% of interviewees in the three cities stated they consumed vegetables on a daily basis (table 1, page 99).

Measurement model, reliability and validity

The first step in this research was to carry out a confirmatory factor analysis (CFA) for the totality of constructs (intrinsic attributes, extrinsic attributes, perceived risks and opinions of food safety label). This analysis was developed region by region.

The results of this procedure permitted conclusion of the suitability of this analysis.

Table 2 (page 102-103), summarizes CFA results and shows parameters used to test the robustness of the constructs for the multi-sample model. In relation to reliability of factor loading, the majority were above 0.5 for all regions and *t*-values of each item was significantly associated with specified constructs ($p < 0.001$) (5). Internal consistency of the model was assessed through composite reliability test (CR), in which the majorities of the constructs were close to or above 0.7, internal consistency reliability measured by Cronbach's α (CA) (ideally above 0.7, but values above 0.6 are considered acceptable) (23) and the average variances extracted (AVE) were close to or above 0.5. Since correlations among constructs do not exceed 0.85, it is stated that discriminant validity was obtained. Therefore, the scales used in the study presented moderate to high reliability and validity. Consequently, the internal validity of the measurement model was adequate in the three regions.

In addition, table 2 (page 102-103), shows the validation of the measurement model (Multi-sample confirmatory model), which fits properly (15, 23, 26, 31).

Multigroup invariance

After testing the reliability and validity of the measurement model in the three regions separately and conjointly, multi-group invariance was analyzed (table 3, page 104). As previously mentioned, the first step was to determine a point of reference to test the whole hypothesized relationships in the theoretical model in terms of the goodness of fit indices, and then the acceptable fit of the model ($\chi^2 = 481.149$; $\chi^2/gl = 2.72$, CFI = 0.94, GFI = 0.94, NFI = 0.91, and RMSEA = 0.039). Configural invariance was achieved across the three regions. This level of invariance provided support for the fixed and non-fixed configuration of parameters in the research model, which were the same for the three regions (Steenkamp and Baumgartner, 1998).

The next step was to evaluate metric invariance, that is, invariance of factor loadings across the three samples. Metric invariance was not supported; due to this restriction the χ^2 value increases from 481.15 to 549.64, gaining eighteen degrees of freedom. Since the metric invariance model (Model 2) is nested within the base model (Model 1), it was tested the $\Delta\chi^2$ between measured model (Model 1) and constrained model (Model 2).

Taking into account that the $\Delta\chi^2$ of 68.49 with eighteen degrees of freedom was statistically significant at < 0.05, the metric invariance was not confirmed. In addition, it was used the goodness of fit model (CFI = 0.93, GFI = 0.93, NFI = 0.90, RMSEA = 0.040), which confirmed the goodness of fit for Model 2; the metric invariance among the samples is not confirmed.

The significance of Model 2 (metric invariance) with respect to Model 1 (configural invariance) precludes their subsequent comparison with the scale invariance (Model 3). Therefore, it has been obtained a common model among the three regions in Chile.

Structural Model

The next step was to test the moderator effect of food safety label between risk perception and quality perceived for fresh vegetables, for males and females. Intrinsic and extrinsic attributes for fresh vegetables conformed perceived quality (H1) for males (β = 0.25, P <0.05; β = 0.64, P <0.01 respectively) and females (β = 0.10, P <0.05; β = 0.35, P <0.05 respectively). Risk perception revealed a significant effect on perceived quality (H2) for males (β = 0.45, P <0.01) and females (β = 0.44, P <0.001).

However, the moderator effect of food safety label between risk perception and perceived quality was different for both sexes (H3). No significant effect was reported in males (figure 2A, page 104); while in a significant effect was found for females (β = 0.22, P <0.05). These results indicated that the risk perception predicted perceived quality for fresh vegetables for both sexes. However, the moderator effect of food safety label was observed only for females (figure 2B, page 104).

DISCUSSION

The majority of consumers interviewed expressed the habit of purchasing their fresh vegetables in traditional markets. Consequently, they do not question whether the fresh vegetable is produced under GAP or not, how it is transported (refrigerated truck or not) and stocked (cool storage or not) prior to sale. This consumer habit leads to acceptance of poor food safety conditions and produces market inefficiency in food safety for vegetables (27). This condition reflects that consumers are not worried about food safety until they suffer an incident, in which their health is harmed. This shows that consumers often behave in an irrational and/or illogical way in relation to food safety and risk information (54).

With the objective of addressing the gap found in the consumer behavior literature toward food safety, the present study provides empirical evidence from a gender perspective regarding the influence of the food safety label on both risk perception and perceived quality for fresh vegetables. Three regions in central and south central Chile were selected to test the proposed model which enables the generalization of the results to countries with similar characteristics.

Results support the hypotheses tested

The first hypotheses (H1) shows for both males and females that perceived quality for basic goods, such us fresh vegetables, is composed by intrinsic and extrinsic attributes. Intrinsic attributes are composed by organoleptic characteristics whereas extrinsic attributes are composed by credence attributes such as nutritional content, nutritional label and food safety label. These findings concur with Martínez-Carrasco *et al*. (2012) and Mora *et al*. (2011) whom found similar results for fresh tomatoes and peaches, respectively.

Table 2. Reliability and validity of the standardized confirmatory factor analysis (CFA).
Tabla 2. Confiabilidad y validez del análisis factorial confirmatorio estandarizado (CFA).

Variables	Metropolitana		Maule		Araucanía	
	S.L.	t-value	S.L.	t-value	S.L.	t-value
Perceived Risk						
x1: I would like that vegetables don't have pesticide residuals	0.70	10.59	0.75	12.76	0.91	26.29
x2: I would like that vegetables are not grown with contaminated water	0.84	10.38	0.87	12.85	0.88	25.13
x3: I would like that vegetables are not contaminated with microorganisms	0.65	a	0.72	a	0.91	a
Intrinsic Attributes						
x4: The aroma is important in vegetables	0.71	4.63	0.55	7.22	0.76	7.74
x5: The size is important in vegetables	0.38	4.38	0.78	9.81	0.68	8.23
x6: The color is important in vegetables	0.77	4.50	0.56	7.37	0.60	7.26
x7: The homogeneity is important in vegetables	0.30	a	0.61	a	0.52	a
Extrinsic Attributes						
x8: To what extend do you agree that you use vegetables for their nutritional content?	0.55	6.99	0.51	8.28	0.62	8.56
x9: To what extend do you agree that you use vegetables for their nutritional labeling?	0.68	7.51	0.77	9.95	0.68	8.84
x10: To what extend do you agree that you use vegetables food safety label?	0.64	a	0.81	a	0.72	a
Food Safety Label						
x11: A food safety label gives me credibility on the safety of the vegetables	0.75	22.47	0.52	9.67	0.66	13.98
x12: A Food safety label on vegetable makes me think that the product has better quality	0.97	17.48	0.91	12.37	0.93	17.70
x13: I am willing to pay for food safety label on vegetables	0.86	a	0.79	a	0.87	a

a: Fixed parameter; S.L.: Standardized Loading; CA: Cronbach's Alpha; CR: Composite Reliability; AVE: Average Variance Extracted; Measuremente Model: χ^2 = 481.15 df = 177 χ^2/df = 2.72 p = 0.000 RMSEA = 0.039 CFI = 0.94 GFI = 0.94 NFI = 0.91.

a: Parámetro fijado; S.L.: Cargas estándarizadas; CA: Alfa de Cronbach; CR: Confiabilidad Compuesta; AVE: Varianza media extraída. Modelo de Medida: χ^2 = 481,15 df = 177 χ^2/df = 2,72 p = 0.000 RMSEA = 0,039 CFI = 0,94 GFI = 0,94 NFI = 0,91.

Table 2 (cont.). Reliability and validity of the standardized confirmatory factor analysis (CFA).
Tabla 2 (cont.). Confiabilidad y validez del análisis factorial confirmatorio estandarizado (CFA).
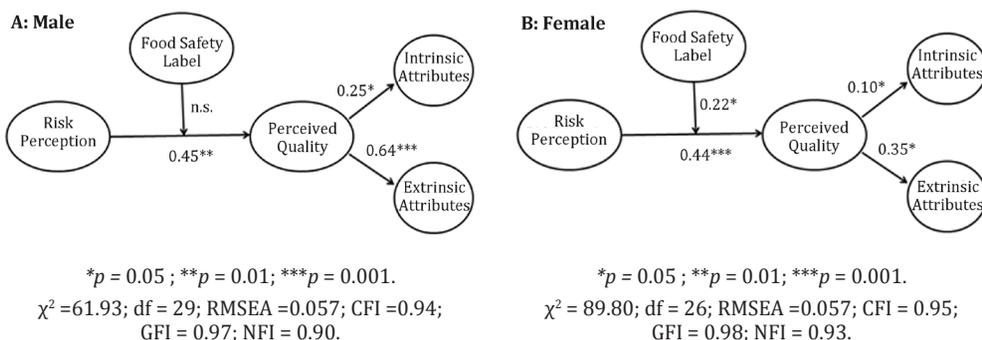
Factors	Metropolitana			Maule			Araucanía		
	CA	CR	AVE	CA	CR	AVE	CA	CR	AVE
Perceived Risk	0.77	0.78	0.54	0.82	0.83	0.61	0.93	0.93	0.81
Intrinsic Attributes	0.61	0.64	0.33	0.71	0.72	0.40	0.73	0.74	0.42
Extrinsic Attributes	0.65	0.66	0.40	0.73	0.75	0.50	0.72	0.71	0.46
Food Safety Label	0.88	0.90	0.75	0.75	0.79	0.57	0.85	0.87	0.69

α : Fixed parameter

S.L..: Standarized Loading

CA: Cronbach's Alpha

CR: Composite Reliability

AVE: Average Variance Extracted

Measurement model $\chi 2 = 481.149$ $df = 177$ $\chi2/df = 2.718$ $p = 0.000$ $RMSEA = 0.039$

S.L..: Standarized Loading

CA: Cronbach's Alpha

CR: Composite Reliability

AVE: Average Variance Extracted

$CFI = 0.940$ $GFI = 0.938$ $NFI = 0.910$

a: Fixed parameter; S.L.: Standarized Loading; CA: Cronbach's Alpha; CR: Composite Reliability; AVE: Average Variance Extracted;
Measuremente Model: $\chi^2 = 481.15$ df = 177 $\chi^2/df = 2.72$ p = 0.000 RMSEA = 0.039 CFI = 0.94 GFI = 0.94 NFI = 0.91.

a: Parámetro fijado; S.L.: Cargas estándarizadas; CA: Alfa de Cronbach; CR: Confiabilidad Compuesta; AVE: Varianza media extraída.
Modelo de Medida: $\chi^2 = 481,15$ df = 177 $\chi^2/df = 2,72$ p = 0.000 RMSEA = 0,039 CFI = 0,94 GFI = 0,94 NFI = 0,91.

Table 3. Invariance tests across three samples.

Tabla 3. Prueba de invarianza a través de las tres muestras.

Model description	χ^2	df	χ^2/df	p	CFI	GFI	NFI	RMSEA	(90% CI)
Metropolitana sample	183.34	59	3.10	0.00	0.92	0.93	0.89	0.075	(0.063; 0.088)
Maule sample	146.81	59	2.49	0.00	0.94	0.94	0.90	0.063	(0.050; 0.076)
Araucanía sample	151.00	59	2.56	0.00	0.96	0.94	0.93	0.066	(0.053; 0.079)
Configural invariance (Model 1)	481.15	177	2.72	0.00	0.94	0.94	0.91	0.039	(0.035; 0.044)
Metric invariance (Model 2)	549.64	195	2.82	0.00	0.93	0.93	0.90	0.040	(0.036; 0.044)
Scalar invariance (Model 3)	726.09	215	3.38	0.00	0.90	0.91	0.86	0.046	(0.043; 0.050)

A: Male

*p = 0.05 ; **p = 0.01; ***p = 0.001.
χ^2 =61.93; df = 29; RMSEA =0.057; CFI =0.94; GFI = 0.97; NFI = 0.90.

B: Female

*p = 0.05 ; **p = 0.01; ***p = 0.001.
χ^2 = 89.80; df = 26; RMSEA =0.057; CFI = 0.95; GFI = 0.98; NFI = 0.93.

Figure 2. Food safety label as moderator of the effect of risk perception on perceived quality for gender.

Figura 2. Etiqueta de inocuidad alimentaria como moderador del efecto de la percepción del riesgo sobre la calidad percibida para el género.

Thereby, food safety for fresh vegetables is part of extrinsic attributes and hence of the perceived quality by consumers as well.

The second hypotheses (H2) established the effect of risk perception on perceived quality for males and females.

The risk perception is a latent variable present in the consumers mind. In that sense, the findings suggest that consumers are aware of risks associated with fresh vegetables, which is in line with previous studies of Bearth *et al.* (2014); Costa-Font and Gil (2009) and Lagerkvist *et al.* (2013).

Moreover, the findings determined that risk perception affects perceived quality toward fresh vegetables for consumers, which is in line with the Consumer Theory (28), since the utility provided by intrinsic and extrinsic attributes as perceived quality (benefits) are affected by disutility associated to risk perception of fresh vegetables.

The third hypotheses (H3) revealed that moderator effect of food safety label between risk perception and perceived quality was found only for females. Therefore, females consider that the food safety label as credence attributes reduced the effect of risk perception on perceived quality for fresh vegetables.

The main reason for this is that females are more aware than men of higher levels of threat and concern from food safety point of view, because they usually have more responsibility in food preparation and consumption (12, 47, 58, 63). This difference between males and females is supported in the Theory of Planned Behavior, because females report more favorable attitudes and perceived behavioral control towards fruit and vegetables intake (18).

In the same line, Taylor *et al.* (2012) highlight that the perceptions of the females mainly place upon the safety and quality of food are important in their food buying choices.

In terms of the limitations of the study, it is worth noting that the sample is not representative of the population distribution of Chile. However, the sample is composed of consumers who are responsible for buying vegetables for the household, as acknowledged by a higher proportion of female interviewees, a situation similar to that in developed countries (42, 44, 45).

In addition, the use of a general category of fresh vegetables instead of a specific single vegetable could affect consumer perception of intrinsic attributes.

Conclusions

The findings reveal that fresh vegetables are purchased mainly on traditional markets. However, the females considered food safety label for fresh vegetables as a credence attribute. This sort of attribute is able to reduce the effect of risk perception on perceived quality.

In consequence, the communicational strategy of the food safety label should be addressed to target females, because this group searches attributes to reduce asymmetry of information, more than males.

In terms of implications, for the demand side, the food safety label for fresh vegetables could be a potential tool for females to recognize unsafe vegetables; at the same time, it can influence the purchase decision of those consumers worried by certain types of risk associated with fresh vegetables such as use of pesticides, irrigation water and microorganism contamination.

On the other hand, considering the supply side, our results suggest that the food safety label for fresh vegetables could be an attribute required by marketers in the wholesale and retail sector from the traditional channel, as a credence attribute that reduces risk perception and gives trust to consumers, especially for females.

Therefore, food safety label could have a positive impact on domestic markets, such as the modernization of the traditional fresh vegetables market, improvement in the quality assurance systems such as chemical residues controls, cold chain, conservation and food storage among others, as well as compliance with existing rules and control of commercialized products. The above is relevant, considering the growing level of development in Chile will put pressure on the public sector to invest in a quality control system, especially within the traditional fresh vegetable market.

As for the limitations of the study, it is worth noting that the research was conducted with convenience sample in a South American country. Nevertheless, the findings are relevant for both developing economies and international trade.

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