

Factors influencing consumers' knowledge towards contaminated peanut-based products

¹Hassan, N. A., ^{*1,2}Kamarulzaman, N. H. and ¹Mohd Nawi, N.

¹Department of Agribusiness and Bioresource Economics, Faculty of Agriculture, Universiti Putra Malaysia, 43400 UPM Serdang

²Halal Products Research Institute, Universiti Putra Malaysia, 43400 UPM Serdang

Article history

Received: 26 January, 2018

Received in revised form:

7 September, 2018

Accepted: 1 December, 2018

Abstract

Food products contamination has become a huge global issue, mostly related to foodborne diseases. Morbidity and mortality are on the increase worldwide due to the increasing incidence of foodborne diseases. Peanut-based products are reported to contribute significantly to food contamination issues. It needs to be addressed well to make sure consumers are safe from these hazards. Besides, all of the scientific knowledge of food products contaminations symptoms needs to be known not only among scientists but also among consumers. Thus, the objectives of this study are to examine consumers' knowledge level towards contaminated peanut-based products and to determine factors influencing consumers' knowledge towards consuming contaminated peanut-based products. A survey using a structured questionnaire was carried out among 1,263 respondents who consumed peanut and peanut-based products in daily, weekly or monthly diet at Klang Valley area. The results from this study showed that about 73.9% of total respondents have inadequate knowledge and only 26.1% have adequate knowledge towards the issue of contaminated peanut-based products. The results also indicated that there are five factors (mass media, practicing standard, packaging information, experience, and official government website) that greatly influenced consumers' knowledge towards the issue of contaminated peanut-based products. Consumers who have lack knowledge of the danger in consuming contaminated peanuts-based products are at risk of adverse health effects if consumed in a long term. Hence, the government and NGOs need to carry out campaigns that would increase awareness among consumers towards the risks of consuming contaminated peanut-based products.

© All Rights Reserved

Keywords

Consumers
Knowledge
Aflatoxin
Contaminated peanut-based
products

Introduction

Nowadays, health consciousness has become a trend among consumers in their daily diet and to enhance their quality of life. This is in line with the advancement in food production technology and this trend encourages consumers to consume varieties of food and food products. However, food products are recently reported to be involved in food safety issues. World Health Organization (WHO, 1984) described food safety as ensuring that food is safe in the production, processing, storage, distribution, and preparation stages to fit human consumption. Food safety is a common issue either in underdeveloped, developing or developed countries (Scott *et al.*, 2003) and this commonly reflects in foodborne illness due to climate condition, food handling related to hygiene

process and excessive use of food additives. The incidence of foodborne illness has been frequently reported in Malaysia due to food contaminations itself; either the problem comes from raw ingredients, food additives or basic foodstuffs (Abdul-Mutalib *et al.*, 2015). Peanut-based products and several other nutty products are facing the same issues of products contaminations due to natural contamination and non-hygiene practices (Schaffner *et al.*, 2013; Ban *et al.*, 2014; MOH, 2015; Grasso *et al.*, 2015).

Peanut or groundnut is an annual crop with the scientific name *Arachis hypogaea*. Peanut is a grain legume which is mostly grown in the tropics and subtropics areas and now grown throughout the world. There are four major varieties of peanut in the global market namely Runner, Virginia, Spanish and Valencia (National Peanut Board, 2017). The runner is one of the hybrid varieties from subspecies

*Corresponding author.
Email: nitty@upm.edu.my

of Virginia (*hypogaea hypogaea*) and Spanish (*fastigiata Vulgaris*) (Krapovickas, 1969).

World production of peanut has been on an increase over the years reaching 41.5 million metric tons of in-shell peanut, a 2% increase from the previous season (International Nut and Dried Fruits Council Foundation (INC), 2017). China, India, and Nigeria are the three largest producer countries of peanuts taking up 62% of the total world productions. The other producer countries of peanut are the United States of America, followed by Indonesia, Argentina, and a few other countries (International Nut and Dried Fruits Council Foundation (INC), 2017). India is the largest exporting country in 2015, exporting about 1.6 million metric tons of shelled peanut. Indonesia, Malaysia, Thailand, Philippines, and Vietnam are the main importing countries of India's shelled peanut exports, accounting for 77% of total Indian shelled peanut exports (International Nut and Dried Fruits Council Foundation (INC), 2017). Peanut and the other nutty products make up a staple food in most of the countries in the world.

Peanut is one of the side protein sources in most of the countries in the world. Even peanut is not a major protein source, yet it is still an essential component of protein diet sources among consumers. Malaysian consumers usually consumed peanut

in form of finish products or ready-to-eat (RTE) foodstuff (roasted peanut, unshelled peanut, and peanut candy) and consume as a local cuisine such as satay sauce, desserts, pastries, buns and cookies (Mohd Azaman *et al.*, 2016). Table 1 shows the world peanut consumption and Malaysia is listed in the top 12 of the highest peanut consumption in 2015. Research showed that average Malaysian consumers' daily intake of peanut and peanut-based products is around 56.90 g per day (Arzandeh *et al.*, 2010). The data in Table 1 revealed an increasing trend in peanut consumption among Malaysian consumers as the country ranked 12, a three-step increase from 15 in the last three years (International Nut and Dried Fruit Council Foundation (INC), 2015; International Nut and Dried Fruit Council Foundation (INC), 2017).

The increasing rank of peanut consumption reflects an increasing consumption of peanut and peanut-based products among Malaysian consumers. However, this nutty product could easily be contaminated due to the factors of climate condition and non-hygiene practices. Thus, Malaysians to a large extent are susceptible to the risk effects of contaminated peanut and peanut-based products due to the availability of products in the market (Mohd Azaman *et al.*, 2015). Some of the peanut-based products are reported to have been contaminated with

Table 1: World Peanut Consumption

Country/ Year	Consumption In Metric Tons (Million)				
	2011	2012	2013	2014	2015
China	15.934	16.462	16.421	16.636	16.682
India	5.293	4.339	1.096	4.247	4.093
Nigeria	1.550	1.550	3.000	2.999	3.000
USA	1.760	2.116	1.992	2.213	2.614
Indonesia	1.526	1.272	1.365	1.367	1.324
Vietnam	0.568	0.743	0.667	0.648	0.574
Brazil	0.229	0.226	0.279	0.287	0.348
Mexico	0.179	0.159	0.204	0.212	0.220
Germany	0.060	0.074	0.085	0.082	0.097
Nicaragua	0.046	0.042	0.059	0.115	0.094
Canada	0.087	0.074	0.083	0.087	0.091
Malaysia	0.097	0.074	0.058	0.072	0.084
UK	0.075	0.046	0.071	0.068	0.070
Thailand	0.035	0.025	0.029	0.036	0.069
Russian Fed.	0.073	0.047	0.066	0.070	0.064
Philippines	0.054	0.058	0.057	0.070	0.062
South Africa	0.091	0.107	0.103	0.078	0.035
Algeria	0.030	0.015	0.041	0.040	0.033
Japan	0.029	0.013	0.025	0.029	0.026
Poland	0.019	0.024	0.030	0.028	0.022
World Total	36.231	35.991	35.991	39.144	41.701

Source: International Nut and Dried Fruit Council Foundation (INC) (2017)

aflatoxin (AF), Salmonella and possible metal pieces (Anzardeh *et al.*, 2010; MOH, 2015). Aflatoxin (AF) and Salmonella can be categorized as biological contaminations while possible metal pieces are categorized as physical contamination. Aflatoxin (AF) is one type of mycotoxins that naturally produced by certain fungi such as *Aspergillus flavus* and *Aspergillus paraciticus*. Aflatoxin (AF) commonly found in cereals foodstuffs such as peanut, corn and other spices products. Salmonella infection and possible metal pieces occur during the processing stage due to non-hygiene practices. These contaminations are reported to have a high risk of contamination in peanut-based products (Sulaiman *et al.*, 2007; Sabran *et al.*, 2013).

All of these contaminations would give negative effects to consumers' health (Schweihofer, 2013). Physical contamination will lead to injuries such as choking, cuts or broken teeth. Some of the foreign materials in food products may not be a physical hazard but rather an undesirable foreign material such as hair and insects. Salmonella infections can cause nausea, vomiting, abdominal cramps, diarrhea, fever, and headache (Schweihofer, 2013). However, the huge effects of AF among adults are liver and gallbladder cancer other than convulsion and also have been linked to stunted growth in children. Death is also possible for individuals who are lower of the body immune system.

Malaysian consumers could easily be exposed to the potentials of peanut-based products contamination. The issue of contamination in peanut-based products is worrying as there are reports indicating that consumers have high possibility to consume contaminated products which led to serious illness. Thus, it is important to investigate the level of consumers' knowledge and factors influencing consumers' knowledge towards the consumption of contaminated peanut-based products. This is due to the fact that consumers do not fully understand the label on the packaging and some symptom of contaminated peanut-based products. All of the scientific knowledge of food contaminations symptoms needs to be known not only among scientists but also among consumers (Ziman, 2004). Usually, consumers always expect all food to be intrinsically safe for human consumption and nutritious to be consumed (Verbeke *et al.*, 2007). This study was conducted with two objectives; the first objective was to investigate the level of consumers' knowledge towards contaminated peanut-based products and the second objective was to determine the factors that influence consumers' knowledge towards consuming contaminated peanut-based products.

Literature review

Food safety

Food safety has been the public concerned among consumers due to the increasing cases of foodborne illness related to food processed products (WHO, 2015). Food safety issues not only impact on consumers' health but also impact on the industry itself. Food safety incidence that causes foodborne illness can affect various industry chains in a number of ways and these include trade bans, fluctuation of price, culling animals, decreased products consumption, jeopardize the image of a particular industry that responsible for the incidence and more generally to the image of the food industry (Buzby, 2001; Verbeke, 2001). According to Smith and Riethmuller (1999), consumers' concerns towards the foods they eat have been increased due to the increasing number of "food scares" in recent years. There are the examples of foodborne diseases such as "mad cow diseases" in the United Kingdom, the Arnotts Biscuits poisoning, contaminated ham in Victoria and Australian peanut paste products affected by salmonella bacteria (Smith and Riethmuller, 1999).

According to Abdul Mutalib *et al.* (2015), foodborne diseases are not rare in the industrialized countries because 30% of the global population experience foodborne diseases each year and this is known as the incidence rates. Incidence rates can be described as the number of new cases per population at risk in a given time period. Incidence rates have been reported in few developed countries to be more than 25,000 cases per 100,000 inhabitants in Australia and the United States of America, 2,600 cases per 100,000 in the United Kingdom and 1,210 cases per 100,000 in France (Teisl and Roe, 2010). However, incidence rates in Malaysia are lower compared to these countries with an estimated amount of about 48 cases per 100,000 because most of the cases were unreported and a chain of events need to be addressed first before it is brought to the authority, with the majority denoted as food poisoning (56.25%) and a mortality rate of 0.03% (MOH, 2013).

Food products contamination

Food contamination can be defined as "food that has been polluted or mix with another undesirable substance whether physical, biological or chemical" (Santacruz, 2016). Biological contamination refers to food that is contaminated by organisms including microorganisms such as bacteria, viruses, yeasts, molds, and parasites (Schweihofer, 2013). Two biggest causes of biological contaminations

are viruses and bacteria that can result in some of the most common types of food poisoning such as salmonella, *Escherichia coli*, *Listeria*, and norovirus (Santacruz, 2016). Physical contamination refers to foreign materials or anything that can be seen and is not part of the food originally (Santacruz, 2016). Some of the foreign materials in food products may not cause physical hazard but rather an undesirable foreign material such as hair, nail, and insects. Physical contamination can cause injury such as choking, cuts or broken teeth to an individual who accidentally consumes the foreign object. Chemical contamination refers to food that has been contaminated with a natural or artificial chemical substance (Nasreddine and Parent-Massin, 2002). All of these contaminations can occur at any stage of production process whether by pesticides, transferred from the soil to the raw food or during the manufacturing process such as exceeding used of coloring, sweeteners or food artificial.

There are two types of contamination in peanut-based products itself which are biological and physical contaminations. Some serious cases of food products contaminant cause foodborne diseases such as diarrhea, fever, headache, convulsion, vomiting, stunted growth among children and can also cause death for the weakened immune systems (WHO, 2015). Salmonella has infected nine people in North California due to consumption of contaminated peanut butter (CDC, 2015). Another contaminated peanut-based products issue is reported by the Ministry of Health Malaysia (MOH) towards possible metal pieces in Skippy Reduced Fat Creamy Peanut Butter Spread from the United States of America. U.S Food and Drug Administration (USFDA) recalled the batch product of 16.3-ounce jars, “Best If Used By” DEC1416LR1 with UPC code 37600-10500 (MOH, 2015). There are few cases of Aflatoxin (AF) exceeding the permitted limit by Regulatory Agency of Mycotoxins in ASEAN which happened in few states in Malaysia such as Penang, Terengganu, and Perak. Reports suggested that about 78.57% of the total samples randomly collected from Malaysian supermarket have been contaminated with AF and more than 10% exceeded the permitted limit of 15 ng/g set by the Codex (Arzandeh *et al.*, 2010).

Factors influence knowledge

First proposed Theory of Planned Behaviour (TPB) by Icek Ajzen pointed out that attitude; subjective norm and perceived behavioural control was the predictor of human behaviour (Ajzen, 1991). Attitude can be described as the degree to which a person has a favourable or unfavourable evaluation

or appraisal of the behaviour of interest towards some issues (Aziz and Chok, 2013). Subjective norm is the second predictor and refers to perceived social pressure to comply with expectations about engaging in the behaviour, which should influence the individual’s behaviour to perform or not to the behaviour. Behavioural control refers to the ease or difficulty of performing the behaviour or consuming a specific product. Perceived behavioural control also leads to the consumption of a product (Aertsens *et al.*, 2009). In general, knowledge refers to the understanding of or information about a subject that an individual gets by experience or study (Lortie *et al.*, 2012). According to Huber (1991) and Nonaka (1994), knowledge is justified belief that increases an entity’s capacity for effective action. Based on Mohd Azaman *et al.* (2016), most of the people in the region are not aware as regards to the danger of consuming moldy peanuts or contaminated peanut due to the low level of knowledge towards the effect of contaminated peanut-based products.

The extension of Theory Planned Behaviour (TPB) which was proposed by Ajzen (2017) has included the background factors namely individual, social and information that influence behavioural beliefs, normative belief and control beliefs. Adaptation of these new background factors showed that they have contributions in predicting consumers’ behaviour towards contaminated peanut-based products. Experience, information, stereotypes, media, and social background can be related to knowledge as the factors for gaining knowledge towards the issues of contaminated peanut-based products (Ajzen, 2017). Thus, this background factors can be accepted as the factors which may influence consumers’ knowledge towards contaminated peanut-based products.

Materials and methods

A quantitative survey was used in this study to collect data from target respondents using a structured questionnaire. The questionnaire was established in both Malay and English languages which consisted of relevant questions on factors influencing consumers’ knowledge towards consuming contaminated peanut-based products. A pilot study indicated that there was no difference in understanding between both Malay and English versions of the questionnaire and to ensure that all questions were clear and properly structured. The questionnaire was designed based on the important information which is needed to meet the study objectives.

There were three sections in the questionnaire namely socio-demographic profiles of the respondents,

knowledge level and factors influencing consumers' knowledge towards consuming contaminated peanut-based products. In Section A, questions on socio-demographic profiles include age, gender, race, religion, marital status, educational level, household number, and income were established.

Meanwhile, Section B consisted of questions on consumers' knowledge towards the issue of contaminated peanut-based products. The questions in this section were established to measure consumers' knowledge level towards consuming contaminated peanut-based products. There were 10 questions asked in this section and from the questions, there were three (3) questions with the incorrect statements. These questions were designed based on the statements about the issues of contaminated peanut-based products using a 3-point Likert scale such as No=1, Not Sure=2 and Yes=3. For those respondents who answered (3=Yes) to the incorrect statements would give zero (0) score and score one (1) for those who give the correct answer (No=1). For those respondents who answered (3=Yes) to the correct statements would give one (1) score and score zero (0) for those who provided the incorrect answer (No=1). The respondents who chose two (2=Not Sure) were also given zero (0), reason that the respondents have inadequate knowledge towards the particular issue. A score of knowledge level was adapted from Huang *et al.* (2006) based on 10 statements (Table 2). The respondents who achieved a total score of more than 70% from 10 statements were considered to have adequate knowledge (Huang *et al.*, 2006). The respondents who achieved a total score less than 70% from 10 statements were considered to have inadequate knowledge (Huang *et al.*, 2006).

Table 2: Knowledge Level Scale towards Consuming Contaminated Peanut-Based Products

Knowledge Level	Score
Adequate knowledge	7-10
Inadequate knowledge	0-3

Sources: Huang *et al.* (2006)

Section C consisted of 18 statements which were adapted from the literature review (Ajzen, 2017) related to the factors that influence consumers' knowledge towards consuming contaminated peanut-based products. Eighteen (18) statements were identified as the possible factors that may influence consumers' knowledge towards consuming contaminated peanut-based products. A 5-point Likert Scale was used for these 18 statements that related to factors that influence consumers' knowledge such as (1=strongly disagree), (2=disagree), (3=neutral), (4=agree), and (5=strongly agree).

The survey was carried out to obtain responses from 1,263 respondents located in Klang Valley, Malaysia from the selected supermarkets, malls, and carnivals such as Food and Fashion Carnival and Putrajaya International Book Fair. The number of sample size was based on the typical sample size for social science studies of human behaviour that was proposed by Sudman (1976). This approach was suggested that the minimum sample size of the study is 1,000 samples. Furthermore, Slovin's formula revealed the relevant sample size outcome by using formula with the exact amount of sample size. Based on Slovin's formula, 1,110 respondents are the sufficient sample sizes for social science studies and this amount is parallel with Sudman (1976). Hence, 1,263 respondents were sufficient to represent the community in Klang Valley area.

This study applied a purposive sampling method to identify the target respondents who met some requirements or standards. Purposive sampling can be explained as a sampling technique when the researcher specifies the characteristic of the respondents. In this study, respondents who over 18 years old and only consumed peanut-based products in their diet were selected.

There were two types of analysis used to achieve the objectives of study namely descriptive analysis and factor analysis. Descriptive analysis was used to summarize the socio-demographics of the respondents and to calculate the score of knowledge among consumers, while factor analysis was carried out to determine the factors that influence consumers' knowledge towards consuming contaminated peanut-based products.

Results and discussion

Descriptive analysis

Socio-Demographic Profiles

Table 3 shows the socio-demographic profiles of the respondents. The results showed that more than half of the respondents (60.4%) were aged below than 25 years old with 21 to 25 years old as the highest age range (40.7%) or 514 respondents, followed by less than or equal to 20 years old (19.7%), 26 to 30 years old (19.1%), more than 41 years old (8.2%), 31 to 35 years old (6.2%) and 36 to 40 years old (6.1%). Most of the respondents were female about 63.7% and the remaining percentage was male about 36.3%. The majority of respondents were Malays (67.8%), followed by Chinese (17.7%), Indian (8.2%) and others (6.3%). Based on the results of the survey, the education level of the respondents was categorized into six categories, which most of them were degree

holder (41.7%). The remaining percentages were diploma (24.2%), secondary school (20.8%), master (10.1%), never been to school (1.7%) and PhD (1.4%). Most of the respondents were Muslims (72.8%), followed by Buddhist (12.6%), Hindu (6.7%), Christians (5.9%) and others (2%) included Atheist. Majority of the respondents were single, about 72.0%, followed by married (26.5%) and widower (1.5%). The household number for each family showed that the majority of them have 3 to 5 person per family (46.6%), followed by less than or equal to 2 people (27.7%), 6 to 8 person (22.5%) and more than 9 people (3.2%). Respondents' income has been classified into five groups such as less than or equal to RM1,000, RM1,001 to RM2,000, RM2,001 to RM3,000, RM3,001 to RM4,000 and RM4,001 and above.

Table 3: Socio-demographic Profiles of Respondents

Profiles	Frequency (n=1,263)	Percentage (%)
Age (years old)		
≤ 20	249	19.7
21 to 25	514	40.7
26 to 30	241	19.1
31 to 35	78	6.2
36 to 40	77	6.1
≥ 41	104	8.2
Gender		
Male	458	36.3
Female	805	63.7
Race		
Malay	856	67.8
Chinese	224	17.7
Indian	104	8.2
Others	79	6.3
Religion		
Islam	920	72.8
Christian	75	5.9
Buddha	159	12.6
Hindu	84	6.7
Others	25	2.0
Marital status		
Single	909	72.0
Married	335	26.5
Widow/ widower	19	1.5
Education		
Primary school	21	1.7
Secondary school	263	20.8
Diploma	306	24.2
Degree	527	41.7

Table 3: (Cont.)

Master	128	10.1
PhD	18	1.4
Household number (person)		
≤ 2	350	27.7
3 to 5	588	46.6
6 to 8	284	22.5
≥ 9	41	3.2
Income (RM)		
≤ 1,000	666	52.7
1,001 to 2,000	306	24.2
2,001 to 3,000	142	11.2
3,001 to 4,000	53	4.2
≥ 4,001	96	7.6

Level of knowledge

The consumers' knowledge level based on 1,263 responses is shown in Table 4. The knowledge level was calculated based on respondents score from 10 statements that are related to the issues of peanut-based products contamination. It represented the descriptive analysis of knowledge level towards consuming contaminated peanut-based products among respondents. The results revealed that 73.9% of the total respondents have inadequate knowledge while only 26.1% have adequate knowledge towards the issues of contaminated peanut-based products. The level of consumers' knowledge was measured based on the total score of the 10 statements. The total score of seven (7) and above are represented as adequate knowledge, while a score of seven (7) and below are represented as inadequate knowledge.

Table 4: Level of Knowledge towards Consuming Contaminated Peanut-Based Products

Level	Frequency (n=1,263)	Percentage (%)
Adequate knowledge	330	26.1
Inadequate knowledge	933	73.9

Factor analysis

This study used reliability analysis to measure the reliability of the items (Weiner, 2007). The Cronbach's Alpha for this analysis was 0.869, meaning the variables are valid and reliable for further analysis. The result was in agreement with Bland and Altman (1997) which indicated that Cronbach's Alpha (α) above 0.7 is a good reliability coefficient. Furthermore, reliability analysis with the level that is less than 0.5 is still acceptable in social science studies and marketing research (Peter, 1979).

Exploratory Factor Analysis (EFA) was used in this study to explore the variables on factors influencing consumers' knowledge towards consuming contaminated peanut-based products.

There were 18 statements based on a 5-point Likert scale and three (3) statements were reduced using this analysis as the three statements did not fulfill the requirement. Table 5 shows the results of the Kaiser-Meyer-Olkin (KMO) test of sampling adequacy, Bartlett's test of sphericity and summary of factor analysis. The factor analysis appropriately processed the 15 statements.

Table 5 shows the result of Kaiser-Meyer-Olkin (KMO). The KMO test is used to measure sampling adequacy and to determine the occurrence of correlation among the variables, while Bartlett's test is used to indicate the correlation matrix in the factor model. According to the rule of Kaiser (1974), the value of 0.847, meant that the sampling was adequate and factor analysis could be carried out.

The results on a summary of factor analysis in Table 5 showed that the higher factor loadings (0.6 and above), five factors were extracted and labeled as mass media, practicing standard, packaging information, experience, and official government website. The factor loading for five factors was from 0.637 to 0.881. The five latent factors which accounted for 71.191% of the total percentage of variance are also summarized in Table 5.

Factor 1 consisted of four sub-variables with a subtotal variance of 15.710% that explained *mass media*: "Social media is one of the mediums that I used to gain knowledge towards contaminated peanut-based products" (0.756), followed by "Mass media are the best medium for me to get the latest information about contaminated peanut-based products" (0.717), "Safety information regarding peanut-based products is easy to obtain through mass media such as television, radio and the internet" (0.712) and "Public announcements will increase consumers' knowledge towards the current issues of food contamination (0.677). The results indicated that the most influential factors which affect consumers' knowledge towards contamination in peanut-based products were mass media. Mass media is the big medium to broadcast the latest news in a short time with the current issues of food contaminations.

Factor 2 was labeled as *practicing standard* which has three sub-variables with a subtotal variance of 15.541%: "The government should ensure peanut-based products are Hazard Analysis and Critical Control Point (HACCP) certified producers" (0.853), "The government should ensure peanut-based producers follow Good Manufacturing Practices (GMP) in producing their products" (0.845) and "Peanut-based products should be packed properly to ensure their safety" (0.721). This factor revealed that applying the practicing standard of the local

and international certificate would build consumers' confidence towards the safety of products indirectly increase the knowledge towards contaminated peanut-based products. Practicing standards for peanut-based products is highly recommended which would enhance consumers' knowledge towards the safety of nutty products.

Factor 3 represented *packaging information* which consisted of three sub-variables with a subtotal variance of 14.984%. The items that included in this factor were namely: "Packaging label provides most of the information towards contaminated peanut-based products that consumers need" (0.865), followed by "Products packaging label is the main source of information for consumers to gain knowledge towards contaminated peanut-based products" (0.812) and "Information on packaging label will improve my knowledge towards peanut contamination issues" (0.722). This factor explained that packaging information is one of the factors that would affect the consumers' knowledge towards contaminated commercial nutty products. Most of the information on the packaging such as ingredients, expired dates, certification, products origin and products manufactured provided basic information on products for consumers' to gain their knowledge.

Factor 4 explained about 13.510% of subtotal variance namely *experience* towards contaminated peanut-based products which consisted of three sub-variables. Factor loading for these three items were: "Fatal cases in other countries make me pay more attention towards contaminated peanut-based products" (0.833), "Recall cases in other countries make me pay more attention towards contaminated peanut-based products" (0.827) and "I will know peanut-based products are contaminated after I have experienced some illness" (0.637). Experience can be explained as histories of consumers exposed to the contaminated peanut-based products due to consuming those products. This factor revealed that experience can gain consumers' knowledge as they got involved with this issue of contaminated peanut-based products.

Factor 5 consisted of two sub-variables with the subtotal variance 11.466% that explaining of *official government website*: "Government websites provide lots of information regarding peanut-based products to consumers" (0.881) and "Information on official government websites can improve my knowledge towards food safety issues of peanut-based products" (0.862). Official government website would be the last factor influencing consumers' knowledge towards the issue of contaminated peanut-based products. Recently, most of the information related

Table 5: KMO and Bartlett's Test and Summary of Factor Analysis Results

KMO and Bartlett's Test	
Kaiser-Meyer-Olkin Measure of Sampling Adequacy	
Bartlett's Test of Sphericity	0.847
Approx. Chi-Square	7969.538
Degree of freedom	105
Significant	0.000
Items	Factor loading
Mass media	F1
Social media is one of the mediums that I used to gain knowledge towards contaminated peanut-based products.	0.758
Mass media are the best medium for me to get the latest information about contaminated peanut-based products.	0.717
Safety information regarding peanut-based products is easy to obtain through mass media such as television, radio, and the internet.	0.712
Public announcements will increase consumers' knowledge towards the current issues of food contamination.	0.677
Eigenvalue	5.496
Percentage of Variance (%)	15.710
Cumulative Percentage of Variance	15.710
Practicing standard	F2
The government should ensure peanut-based products are Hazard Analysis and Critical Control Point (HACCP) certified producers.	0.853
The government should ensure peanut-based producers follow Good Manufacturing Practices (GMP) in producing their products.	0.845
Peanut-based products should be packed properly to ensure their safety.	0.721
Eigenvalue	1.547
Percentage of Variance	15.541
Cumulative Percentage of Variance	31.251
Packaging information	F3
Packaging label provides most of the information towards contaminated peanut-based products that consumers need.	0.865
Products packaging label is the main source of information for consumers to gain knowledge towards contaminated peanut-based products.	0.812
Information on packaging label will improve my knowledge towards peanut contamination issues.	0.722
Eigenvalue	1.316
Percentage of Variance (%)	14.984
Cumulative Percentage of Variance	46.235
Experience	F4
Fatal cases in other countries make me pay more attention towards contaminated peanut-based products.	0.833
Recall cases in other countries make me pay more attention towards contaminated peanut-based products.	0.827
I will know peanut-based products are contaminated after I have experienced some illness	0.637
Eigenvalue	1.191
Percentage of Variance (%)	13.510
Cumulative Percentage of Variance	59.745
Official government website	F5
Government websites provide lots of information regarding peanut-based products to consumers.	0.881
Information on official government websites can improve my knowledge towards food safety issues of peanut-based products.	0.862
Eigenvalue	1.129
Percentage of Variance (%)	11.446
Cumulative Percentage of Variance	71.191

to the current issues of food safety and others issue regarding peanut-based products is provided by an official government website. So that consumers' could gain their knowledge towards contaminated peanut-based products based on this factor.

Conclusion

This study was carried out with the purpose of understanding consumers' knowledge and factors influencing consumers' knowledge towards the issue of contaminated peanut-based products. Based on the findings, the factors such as mass media, practicing standards, packaging information, experience, and official government website are the identified factors influencing consumers' knowledge and most of the respondents can be classified as having inadequate knowledge towards the issue of contaminated peanut-based products. The results showed that there is very low level of knowledge towards contaminated peanut-based products. Furthermore, it is important to take special note that consumers need to increase their knowledge level for them to be more careful with the hazards of contaminated peanut-based products. Thus, in completing those goals, the government and NGOs should embark on campaigns to raise consumers' knowledge and awareness. This is due to the consumers generally pay little attention to the hazard side of risks and experts usually completely ignore the outrage side. In manufacturing perspective, manufacturers need to take action towards the issues of contaminated peanut-based products by implementing HACCP guidelines, also need to make sure their products have the important logo such as Halal, expiry date, ingredients and Good Manufacturing Practices (GMP) for consumers to gain their knowledge on products information. Manufacturers as the main component in production surely can control the quality and safety of products.

References

- Abdul-Mutalib, N. A., Syafinaz, A. N., Sakai, K. and Shirai, Y. 2015. An overview of foodborne illness and food safety in Malaysia. *International Food Research Journal* 22(3): 896-901.
- Aertsens, J., Verbeke, W., Mondelaers, K. and Van Huylenbroeck, G. 2009. Personal determinants of organic food consumption: A review. *British Food Journal* 111(10): 1140-1167.
- Ajzen, I. 2017. Theory of Planned Behaviour with Background Factors. Retrieved from website: <http://people.umass.edu/ajzen/tpb.background.html>
- Ajzen, I. 1991. The theory of planned behavior. *Organizational Behavior and Human Decision Processes* 50(2): 179-211.
- Arzandeh, S., Selamat, J. and Lioe, H. 2010. Aflatoxin in raw peanut kernels marketed in Malaysia. *Journal of Food and Drug Analysis* 18(1): 44-50.
- Aziz, Y. A. and Chok, N. V. 2013. The role of Halal awareness, Halal certification, and marketing components in determining Halal purchase intention among non-Muslims in Malaysia: A structural equation modeling approach. *Journal of International Food & Agribusiness Marketing* 25(1): 1-23.
- Ban, G. H. and Kang, D. H. 2014. Effects of gamma irradiation for inactivating *Salmonella Typhimurium* in peanut butter product during storage. *International Journal of Food Microbiology* 171: 48-53.
- Bland, J. M. and Altman, D. G. 1997. Statistics notes: Cronbach's alpha. *British Medical Journal* 314: 572.
- Buzby, J. C. 2001. Effects of food-safety perceptions on food demand and global trade. In Regmi, A. (Ed), *Changing structure of global food consumption and trade*, p. 55-66. Washington: Economic Research Service.
- Centers for Disease Control and Prevention (CDC). 2015. Reported of *Salmonella* Outbreak Investigation 2015. Retrieved from website: <https://www.cdc.gov/salmonella/outbreaks-2015.html>
- Grasso, E. M., Grove, S. F., Halik, L. A., Arritt, F. and Keller, S. E. 2015. Cleaning and sanitation of *Salmonella*-contaminated peanut butter processing equipment. *Food Microbiology* 46: 100-106.
- Huang, M. C., Huang, C. C. and Thomas, K. 2006. Febrile convulsions: development and validation of a questionnaire to measure parental knowledge, attitudes, concerns, and practices. *Journal of the Formosan Medical Association* 105(1): 38-48.
- Huber, G. P. 1991. Organizational learning: The contributing processes and the literatures. *Organization Science* 2(1): 88-115.
- International Nut and Dried Fruit Council Foundation (INC). 2015. Global Statistical Review 2014-2015. Retrieved from website: https://www.nutfruit.org/files/tech/global-statistical-review-2014-2015_101779.pdf
- International Nut and Dried Fruit Council Foundation (INC). 2017. Nut & Dried Fruits Statistical Yearbook 2016/2017. Retrieved from website: https://www.nutfruit.org/files/multimedia/1510229514_1497859419_Statistical_Yearbook_2016-2017.pdf
- Kaiser, H. F. 1974. An index of factorial simplicity. *Psychometrika* 39(1): 31-36.
- Krapovickas, A. 1969. The origin. Variability and spread of the groundnut (*Arachis hypogaea*). The domestication and exploitation of plants and animals, p. 427-441. London: Gerald Duckworth & Co.
- Lortie, M., Desmarais, L. and Laroche, É. 2012. Knowledge managers and transfer agents: Their role and integration in the development and implementation of knowledge translation tools. In *Proceedings of the 13th European Conference on Knowledge Management*, p. 217-225. UK: Academic Publishing International Limited.

- Ministry of Health Malaysia (MOH). 2013. Health facts 2012. Report of Health Informatics Centre, Planning and Development Division. Malaysia: Ministry of Health Malaysia.
- Ministry of Health Malaysia (MOH) and Food Safety Information System of Malaysia (FoSIM). 2015. Issues Skippy Reduced Fat Creamy Peanut Butter Spread Called Back for Reliable Contaminated with Metal Fragments. Retrieved from website: <http://fsq.moh.gov.my/v5/ms/isu-skippy-reduced-fat-creamy-peanut-butter-spread-dipanggil-balik-kerana-dipercayai-tercemar-dengan-serpihan-logam/>
- Mohd Azaman, N. N., Kamarulzaman, N. H., Shamsudin, M. N. and Selamat, J. 2015. Understanding Food Hygiene Practices and Food Safety among Manufacturers towards Aflatoxins Contamination in Peanut-based Products. *International Journal of Supply Chain Management* 4(2): 72-80.
- Mohd Azaman, N. N., Kamarulzaman, N. H., Shamsudin, M. N. and Selamat, J. 2016. Stakeholders' knowledge, attitude, and practices (KAP) towards aflatoxins contamination in peanut-based products. *Food Control* 70: 249-256.
- Nasreddine, L. and Parent-Massin, D. 2002. Food contamination by metals and pesticides in the European Union. Should we worry? *Toxicology Letters* 127(1): 29-41.
- National Peanut Board. 2017. Peanut Types. Retrieved from website: <http://nationalpeanutboard.org/peanut-info/peanut-types.htm>
- Nonaka, I. 1994. A dynamic theory of organizational knowledge creation. *Organization Science* 5(1): 14-37.
- Peter, J. P. 1979. Reliability: A review of psychometric basics and recent marketing practices. *Journal of Marketing Research* 16(1): 6-17.
- Sabran, M. R., Jamaluddin, R., Abdul Mutalib, M. S. and Abdul Rahman, N. A. 2012. Socio-demographic and socio-economic determinants of adults' knowledge on fungal and aflatoxin contamination in the diets. *Asian Pacific Journal of Tropical Biomedicine*: S1835-S1841.
- Santacruz, S. 2016. What is food contamination? Retrieved from website: <https://www.foodsafety.com.au/resources/articles/what-is-food-contamination>
- Schaffner, D. W., Buchanan, R. L., Calhoun, S., Danyluk, M. D., Harris, L. J., Djordjevic, D. and Wiedmann, M. 2013. Issues to consider when setting intervention targets with limited data for low-moisture food commodities: a peanut case study. *Journal of Food Protection* 76(2): 360-369.
- Schweihofer, J. 2013. Biological, Chemical and Physical Hazards assessed with HACCP. Retrieved from website: http://msue.anr.msu.edu/news/biological_chemical_and_physical_hazards_assessed_with_haccp
- Scott, E. 2003. Food safety and foodborne disease in the 21st century. *Canadian Journal of Infectious Diseases and Medical Microbiology* 14(5): 277-280.
- Smith, D. and Riethmuller, P. 1999. Consumer concerns about food safety in Australia and Japan. *International Journal of Social Economics* 26(6): 724-742.
- Sudman, S. 1976. *Applied Sampling* (No. 04; HN29, S8.). New York: Academic Press.
- Sulaiman, M. R., Chye, F. Y., Hamid, A. A. and Yatim, A. M. 2007. The occurrence of aflatoxins in raw shelled peanut samples from three districts of Perak, Malaysia. *Electronic Journal of Environmental, Agricultural and Food Chemistry* 6(5): 2045-2052.
- Teisl, M. F. and Roe, B. E. 2010. Consumer willingness-to-pay to reduce the probability of retail foodborne pathogen contamination. *Food Policy* 35(6): 521-530.
- Verbeke, W. 2001. Beliefs, attitude, and behaviour towards fresh meat revisited after the Belgian dioxin crisis. *Food Quality and Preference* 12(8): 489-498.
- Verbeke, W., Frewer, L. J., Scholderer, J. and De Brabander, H. F. 2007. Why consumers behave as they do with respect to food safety and risk information. *Analytica Chimica Acta* 586(1): 2-7.
- Weiner, J. 2017. Measurement: Reliability and Validity Measures. Retrieved from website: ocw.jhsph.edu/courses/hsre/PDFs/HSRE_lect7_weiner.pdf
- World Health Organization (WHO). 1984. *The Role of Food Safety in Health and Development*. Report of a Joint FAO/WHO. Geneva: Expert Committee on Food Safety.
- World Health Organization (WHO) Regional Office for South-East Asia. 2015. *Food Safety: What You Should Know*. Retrieved from WHO website: http://www.searo.who.int/entity/world_health_day/2015/whd-what-you-should-know/en/
- World Health Organization (WHO). 2015. *Who estimates of the global burden of foodborne diseases*. Report of Foodborne Disease Burden Epidemiology Reference Group 2007-2015. Switzerland: World Health Organization.
- Ziman, J. 2004. *Real science: What it is and what it means*, 2nd ed. United Kingdom: Cambridge University Press.