



Research Article

The General Attitudes of Egyptian University Faculty, Students and Staff towards Genetically Modified Foods

S. A. S. Ismail

Department of Food Hygiene, Faculty of Veterinary Medicine Suez Canal University, Ismailia, Egypt

Correspondence should be addressed to: S. A. S. Ismail; soadismail@yahoo.com

Received 10 April 2013; Accepted 21 May 2013; Published 28 August 2013

Academic Editor: Kamelia M. Osman

Copyright © 2013 S. A. S. Ismail. Distributed under Creative Commons CC-BY 3.0

Abstract

Biotechnology offers a variety of potential benefits and risks. On one hand, it has helped enhance food production and improve the quality and nutritional value of food. On the other hand, concerns have been raised about the health, environmental, and economic repercussions of the use of biotechnology. Consequently, consumer response toward genetically modified food (GMF) has shown a large degree of variance from one country to another, and even within the same country. The present study investigates university employees and students' attitudes toward GMF in the Egyptian context. A questionnaire was used to test the knowledge and opinions about GMF of Egyptian university faculty, staff, and students (n=300). Results of the study reveal that the majority of the respondents prefer to buy healthier, more nutritious, and safer foods that contain less pesticides. Surprisingly, only 4% of those same respondents reported that they were aware of the presence of GMF in the Egyptian market; the majority of the respondents showed total unawareness of agricultural biotechnology and its prevalence in their lives. Results also showed that food safety, health, nutritional value, and taste were the major issues affecting the purchase and consumption of GMF while price and religious restrictions played a minor role. When it comes to the type of GMF, the respondents were more forgiving of plant-based GMF than they were of animal-based GMF; while 50% of the respondents approved plant-based GMF, only 16.7% approved animal-based GMF.

Keywords: Genetically modified food, GM food, attitudes, Egypt.

Introduction

Biotechnological applications are increasingly playing a bigger role in medical, agricultural, and industrial fields alike. One byproduct of such biological applications in the field of agriculture is genetically modified (GM) food. GM food is derived from genetically modified organisms (GMOs) which have had specific changes introduced into their DNA by

genetic engineering techniques. Selected individual genes with specific traits are transferred from one organism to another. Such genetic modification causes the GMOs to gain new characteristics they would not have gained if they were allowed to grow naturally (Verma et al., 2011).

Countries that grew the most transgenic crops in 2010 were the United States, 45%; Brazil, 17%; Argentina, 15%; India, 6%;

Canada, 6%; China, 2%; Paraguay, 2%; Pakistan, 2%; South Africa, 1%; and Uruguay 1% (El-Nawawy, 2012). Over the past few years, GM crops have witnessed a rapid and continuing increase all over the world. Consequently, genetically modified organisms have become a part of our environment and food chain due to the large increase in crop area planted with GM crops (Patron, 2006).

Companies producing and marketing GM food often proclaim that such food provides greater resistance to pests and viruses, higher nutritional value, and longer shelf life. However, environmental groups and consumer protection agencies have repeatedly voiced their concerns about the health, environmental, and economic repercussions of GM food (Patron 2000). Examples of such repercussions included antibiotic resistance, cross breeding, herbicide-tolerant crops, pesticide-resistant insects, biodiversity cross contamination, allergens and other health effects (Batalion 2000).

Laws to regulate the identification and labeling of GM foods vary in different countries; the United States and Canada do not require mandatory labeling of GM foods, however in certain regions such as the European Union, Japan, Malaysia and Australia, governments have required labeling of GM foods. Citing, the undesirable effects health and environmental effects of GM foods, some countries have instituted a total ban on importing food products that contain GM ingredients such as is the case in Egypt (Egyptian Legislation No. 242, 1997).

Even though the Egyptian parliament has enacted a 1997 law that bans the import of food products known to contain GM ingredients, tons of such products find their way on the tables of millions of Egyptians every day. This is mostly due to lack of government resources and lax law enforcement considering that Egypt is not self-sufficient in food production and as a consequence relies heavily on foreign imports of food to satisfy its needs (Egyptian Ministry of Trade and Industry, 2012); it is estimated that Egyptians spent

5.34 billion dollars on food imports in 2012 alone, (Egyptian Central Agency for Public Mobilization and Statistics, 2013). The majority of these food imports came from countries known to produce and export GM food such as the United States, Canada, Argentina, and China.

Since none of these banned food products are properly labelled as GM foods, it is very likely that consumers in Egypt are left out in the dark when it comes to the true nature of the ingredients and safety of these imported foods they consume on a daily basis. No studies have been conducted in Egypt that actually investigate consumer opinions about genetically modified foods as far as we can tell. Therefore, the present study aimed to investigate consumer awareness of GM foods and provide recommendations to control the use of genetically modified foods.

Methodology

Data for the present study were collected during the time period between January 2012 and December 2012. A questionnaire consisting of a total of 25 questions based on the work of Hallman et al., (2003) was used; slight modifications were made to wording of the questionnaire items to reflect the Egyptian habits. The questionnaire collected some basic demographic information about the respondents and focused on their awareness of GM food, labeling of GM foods, applications of genetic modification, and consumption patterns of GM food. The questionnaire was distributed to a stratified sample of faculty members, students, and workers at Suez Canal University, Ismailia, Egypt according to established scientific and ethical criteria (Patron 2000). Copies of the questionnaire were distributed in person; three hundred targeted respondents completed the questionnaires and returned them to the Food Hygiene Department, Faculty of Veterinary Medicine, Suez Canal University, and Ismailia, Egypt. Statistical analysis was performed using standard statistical methods (Swinscow 1991).

Results and Discussion

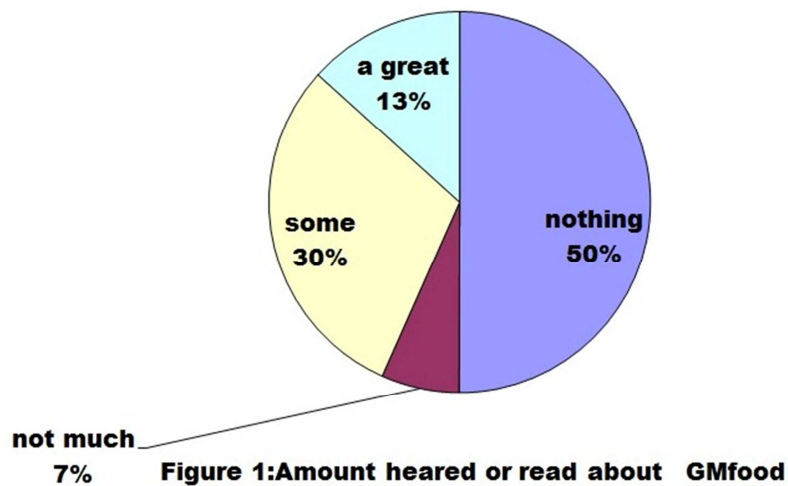
Demographics:

Out of the 300 respondents who completed and returned the questionnaire, 56% were males and 44% females. Their ages ranged from 18 years to 68 years. Ten percent of the respondents were university students; 31% senior faculty members; 13.3% junior faculty members; 16% technicians; 13.7% administrative staff; and 16% custodial staff. Sixteen point six percent of the respondents completed primary school; 16.6% secondary school; 23.3% held college degrees; and 43.5% held graduate degrees.

Awareness of GM Foods:

To measure consumer awareness of biotechnology and GM food, the questionnaire directed the respondents to state how much they know about biotechnology and genetic engineering or genetic modifications.

Fifty seven percent of the respondents had heard or read not much or nothing at all about genetic modification or biotechnology while 30% had heard or read some. Only 13.3% had heard or read a great deal about it (figure 1).



Almost two thirds of the respondents (63.3% to be precise) did not discuss biotechnology or genetic engineering or modification with any one while only

38.6% have discussed these items (figure 2). These findings indicate that Egyptians are not spending a lot of time talking about GM foods.

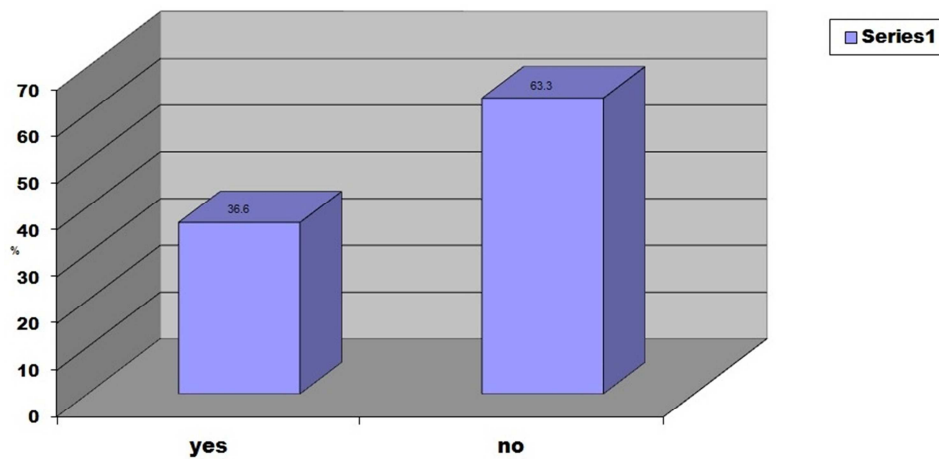


Fig2: Frequency of discussion of biotechnology

Despite of the abundance of products with GM ingredients in the Egyptian market nowadays, only 16.6% of the respondents were aware that GM food products are currently sold in the grocery stores while

13.3% of the respondents did not believe such products were available in the grocery stores. The majority of the respondents (70%) were not sure (Figure 3).

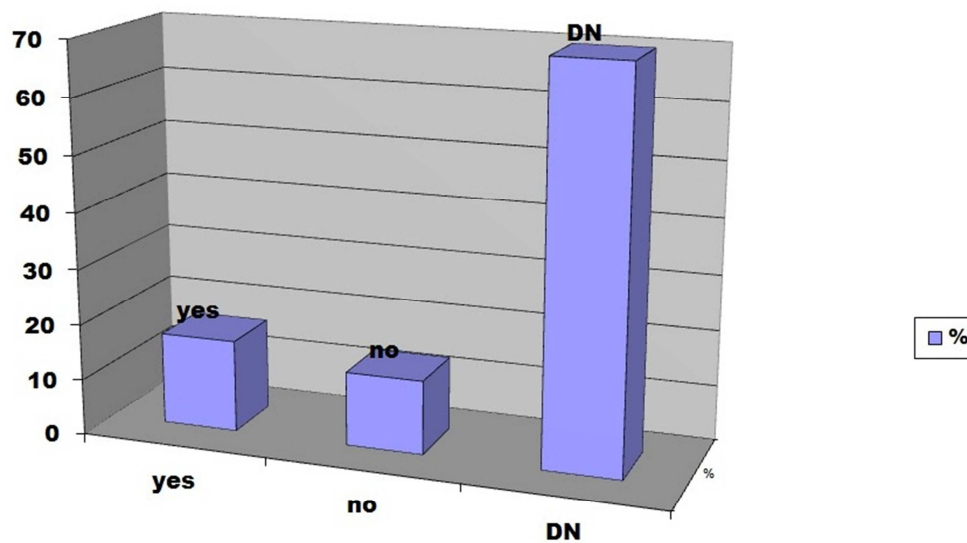


Figure3: Awareness of GM food in supermarkets

As shown in Figure 4, only 4% of the respondents reported that they had consumed food containing GM ingredients.

Seven percent of the respondents said they had not, and 88% were not sure.

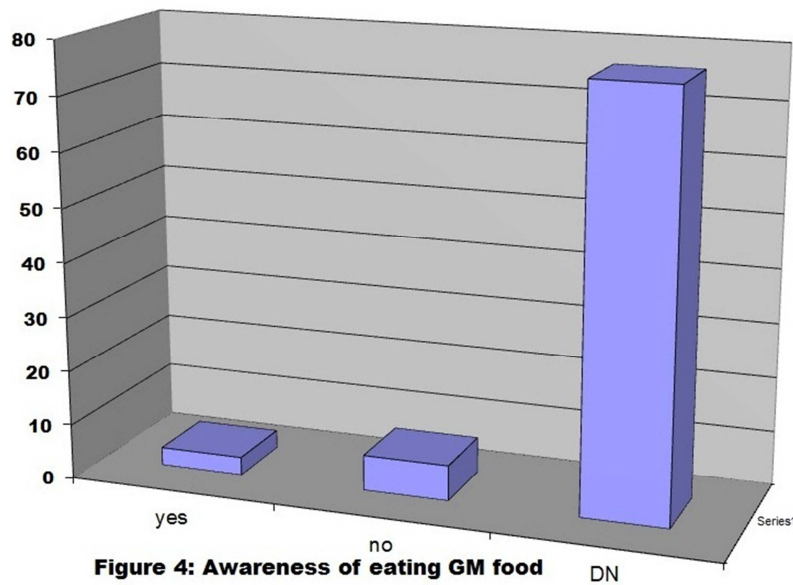


Figure 4: Awareness of eating GM food

These findings illustrate that Egyptians are unaware of genetically modified food and its prevalence in their lives.

Knowledge about Science and Technology:

When asked to rate their knowledge about science and technology, 37% of the

respondents rated their knowledge as fair or poor while 33% rated it as good and 30% thought that their understanding was very good or excellent (Figure 5).

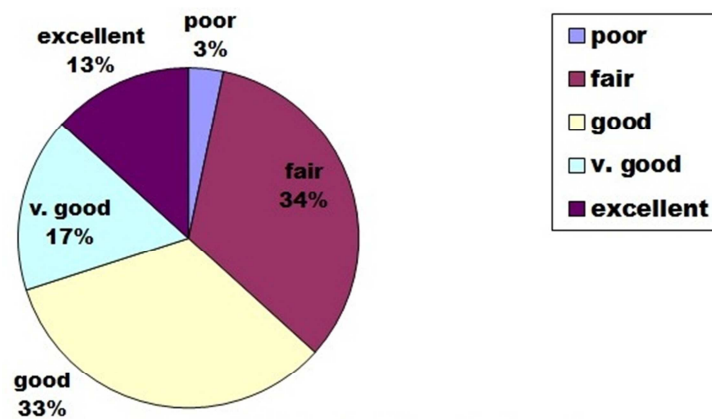


Figure 5: Self rated knowledge of science and technology

Similarly, most respondents reported that they do not know much about biotechnology, genetic engineering, or genetic modification. The majority of respondents claimed to know very little

(17%) or nothing at all (53%) about biotechnology. In contrast, 20% of the respondents said they know a fair amount while only 10% said they know a great deal about the subject (Figure 6).

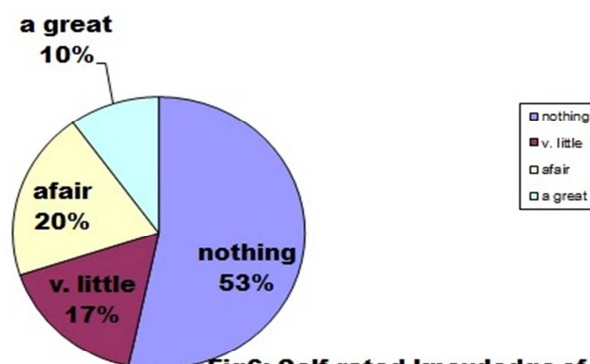


Fig6: Self rated knowledge of biotechnology, genetic engineering or genetic modification

How Do Egyptians Feel about GM Foods?

Our survey indicates that Egyptians' opinion about GM foods are divided as shown in Table 1. Almost half of the respondents (49.9%) approved plant based GM foods whereas only 36.7% approved animal based GM foods. It is obvious that Egyptians express greater support for the genetic modification of plants than they do

for animals, fewer respondents reported approval of animal based products compared to plant based products, and the majority disapproved animal based products (16.6% somewhat disapprove and 40% strongly disapprove). A possible reason is that people usually have a higher risk expectation of animal products than plant ones because of the spread of BSE in recent years.

Table 1: Approval of Genetically Modified Food Products.

	Plant based %	Animal based %
Strongly approve	33.3	16.7
Somewhat approve	16.6	20
Somewhat disapprove	23.3	16.6
Strongly disapprove	16.3	40
Refused	10.5	6.7

Acceptability of GM Foods

Food safety (46.6%), health (46%) nutritional value and taste (33.3%) were the major issues affecting the purchase of GM foods as a safe source of food. Apart from these issues, price (13.3%) and religious reasons (16.6%) played a minor role in the purchase and consumption of GM foods. It is clear that price does not appear to influence consumers as much as other benefits when buying GM foods.

When the respondents were asked to agree or disagree with the statement "I would be unhappy if I were served GM food in a restaurant without knowing it," 26.6% agreed, while 20% disagreed, and the rest (53.4%) did not know. In response to

another question with a similar but slightly different meaning "If food I was eating in a restaurant contained GM food, I would not mind", 16% agreed; 33.3 % disagreed; and 50.7% did not know. This disparity in responses suggests that Egyptians have not made up their minds about GM foods.

The results shown in Table 2 explain why Egyptians consider genetic modification unacceptable. Forty three percent believe that GM food are unhealthy for humans, animals, and the environment while 6.6% thought genetic modification of food changes its taste and nutritional value. Only 3.3% consider it just wrong while 16.6% believed it violates religious or ethical principles.

Table 2: Why Do Egyptians Consider Genetic Modification Unacceptable?

Cause	%
Religious	16.6
Unhealthy for human	16.6
Unhealthy for animals	10
Unhealthy for the environment	6.6
Changes the taste or nutritional value	6.6
Is just wrong	3.3
Others	3.3

Concerns Associated with GM Foods

Egyptians report concerns about potential risks to human health associated with GM foods. Forty percent of the respondents believe it is unsafe to consume genetically modified food while 13.3% said it is safe. Respondents also seem concerned about the potential unintended consequences related to technology. More than one quarter of the respondents (26.6% to be exact) feel serious accidents involving GM foods are bound to happen and 33.3% feel that GM foods threaten the natural order of things; only 10% of the respondents agreed with the statement that "GM food presents

no danger for future generations" while 40% disagreed.

These results indicate that while most Egyptians say they know little about genetic modification, many may be worried about the potential long-term consequences of GM foods.

The results in Table 3 show that 53.3% of the respondents thought genetic modification would improve their quality of life while 46.6% thought it would make their quality of life worse. These measures indicate that Egyptians are slightly more positive about genetic modification.

Table 3: How Egyptians Think GM Food Will Affect their Quality of Life

	%
much better	43.3
somewhat better	10
Somewhat worse	20
Much worse	26.6

Labeling of Genetically Modified Foods

When the respondents were asked how often they read food labels, 33% reported

that they never read them; 3% reported they rarely read them; 17% sometimes; 17% frequently; and 30% said they always read food labels (Figure 7).

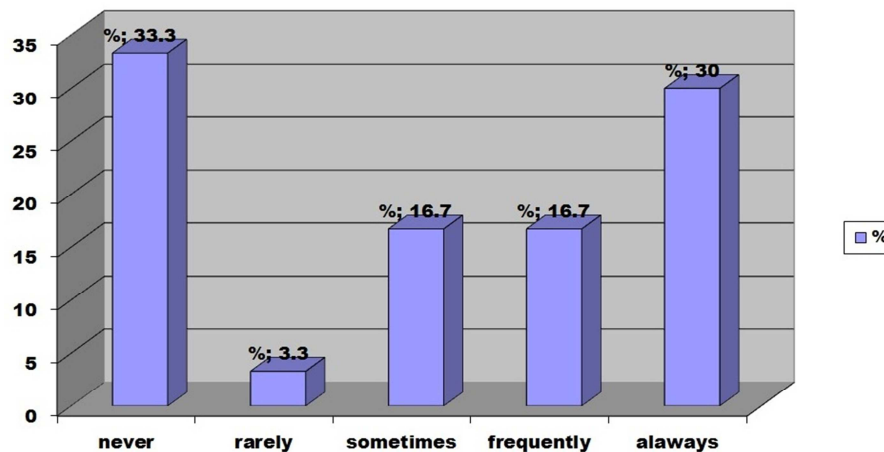


Figure 7: How often do you read food label

When asked about additional information on the food labels, 33.6% said that there was no additional information they were interested in seeing on food labels while 66.4% of the respondents wanted to see additional information.

When asked how labeling GM food would affect their purchasing decision, 33% said it would make no difference and 33% said it would make them less willing to

purchase the product while only 7% of the respondents said they would be more willing to buy GM food and 17% refused to answer.

More than half of the respondents (53.3% to be precise) said that they would take time to read the food labels to see if it contained GM ingredients while 46.6% said they never read food labels (Figure 8).

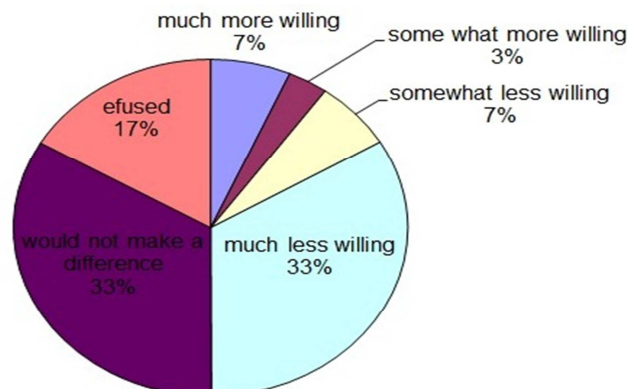


Figure 8: Effect of GM ingredient lable on willings to purchase food products

These results reveal the fact that people want the right to choose for themselves; they want genetically modified food labeled.

Kind of Additional Information on Food Labels

When asked about additional information they would be interested to see on food labels, half of the respondents mentioned genetic modification, 46.6% country of origin, 40% fat content and 40% irradiation, and 26.6% containing pesticides as shown in Table 4.

Table 4: Additional Information on Food Labels

	%
Containing pesticide	26.6
Containing GMOS	50
Fat content	40
Health benefits	20
Grown locally	20
Country of origin	46.6
Certified organic	50
Irradiated	40
More information	46.6
Other	3.3

Differences in Approval by Demographic Groups:

Age and education were found to be related to approval of GM food. Egyptians over 65 years reported less approval for GM food compared to those in other age groups. Among those aged over, 48% said they disapproved plant based GM foods; 20% do not know and 32% approved while 56% disapproved animal based GM food and 16% do not know; only 28% approved.

Respondents with graduate degrees were most likely to disapprove both plant based

(65%) and animal based (76%) GM foods. Only 22% and 20% approve plant and animal based GM foods respectively. On the other hand, respondents with primary and secondary school education were most likely to approve plant and animal based GM foods (58% and 52% respectively).

However, there was no relationship between gender and opinions of GM foods. Both men and women were more likely to disapprove plant based GM foods (55% and 60% respectively) and animal based GM foods (50% and 62.5% respectively) as shown in Tables 5, 6, and 7.

Table 5: Approval of GMF by Age

Age	Plant based GM food			Animal based GM food		
	Approve	Disapprove	Don't know	Approve	Disapprove	Don't know
18-24	32	23	45	28	60	12
25-34	45	33	22	30	55	15
35-44	42	45	13	31	53	16
45-54	40	43	17	29	65	6
55-64	38	46	16	30	59	11
65 or more	32	48	20	28	56	16

Table 6: Approval of GM Foods by Education

Education	Plant based GM food			Animal based GM food		
	Approve	Disapprove	Don't know	Approve	Disapprove	Don't know
Primary school	58	12	30	52	14	34
Secondary school	43	30	27	33	47	20
College	39	46	15	35	55	10
Post Graduate	22	65	13	20	67	13

Table 7: Approval of GM Foods by Sex

Sex	Plant based GM food			Animal based GM food		
	Approve	Disapprove	Don't know	Approve	Disapprove	Don't know
Male	41.6	55	13.4	33.3	50	16.7
Female	30	60	10	25	62.5	12.5

Organic Food Consumers and Approval of GM Foods:

One fifth of respondents reported that they purchase organic food products and that they were less accepting of GM Food. Organic food purchasers had an approval rate of 23% and 27% respectively of plant and animal based GM foods compared with 52% and 32% of non-organic food purchasers. Sixty five percent of organic food purchasers reported that GM technology would make their quality of life worse compared to only 22% of non-organic food purchasers. Organic food purchasers also reported that they know more about genetic modification (45%) compared to (23%) of non-organic purchasers.

Food Allergies and Acceptance of GM Foods:

There was no relationship between food allergy and approval of GM foods as allergic respondents, who made up one-fifth of the sample, were not less accepting of GM foods than the rest of respondents as 59% of the food allergic respondents approved GM foods compared to only 41% of non-allergic respondents.

Conclusion

The present study is the first of its kind to be conducted in Egypt on genetically modified foods. The results of the present study revealed that the majority of respondents are unaware of the presence of GM foods in grocery stores in Egypt. Only a few respondents knew about genetically modified foods. Most respondents did not believe that genetically modified foods are sold in Egypt. Food safety, health, nutritional value and taste were the major issues affecting the purchase of GM foods

while price and religious played a minor role in the purchase and consumption of GM foods. Most respondents consumed food without knowing that they were genetically modified. This may be due to lack of proper labeling.

Acknowledgment

I wish to thank Dr. W. K. Hallman of the State University of New Jersey for granting me permission to use his questionnaire in the present study.

References

- Batalion, N. (2000). 50 Harmful Effects of Genetically Modified Foods, *Americans for Safe Food, Oneonta New York, USA*.
- Central Agency for Public Mobilization and Statistics (2013).
- El-Nawawi, F. (2012). 'Genetically Modified Organisms (Gmos) and Food Safety,' *Egyptian Journal of Food Safety*, 1(1) 1- 14.
- Hallman, W. K., Hebden, W. C., Aquino, H. L., Cuite, C. L. & Lang, J. T. (2003). Public Perceptions of Genetically Modified Foods: A National Study of American Knowledge and Opinion. (Publication Number RR-1003-004). *New Brunswick, New Jersey; Food Policy Institute, Cook College, Rutgers - The State University of New Jersey*.
- Patton, D. D. (2000) Fundamentals of Scientific Research, *Scientific Publishers*, New York.
- Patton, D. D. (2006). "A Survey of Genetically Modified Foods Consumed: Health Implications and Recommendations for Public Health Food Safety in Trinidad," *Internet Journal of Food Safety*, V (7): 4-14.

Swinscow, T. D. V. (1991). 'Statistics at Square One,' *London: British Medical Journal*.

The Egyptian Legislation No. 242 (1997). Disapproving the Import of Foodstuffs Produced by the Use of Genetical Engineering Methods, Until Their Safety is Established.

<http://www.egyptlaws.com/comprehensiv e06.html>

The Egyptian Ministry of Trade and Industry (2012). The Evolution of Imports of the Arab Republic of Egypt from 2008 To 2012 <http://www.mfti.gov.eg/index.asp>

Verma, C., Nanda, S., Singh, R. K., Singh, R. B. & Mishra, S. (2011). "A Review on Impacts of Genetically Modified Food on Human Health," *The Open Nutraceuticals Journal*, 4(1), Pp.3-11.