

Alteration of Attitude toward GM-Foods of Urban Consumer Depending Geographical Regions in Turkey

Iraz HASPOLAT KAYA

Abstract—In the present study, descriptive data concerning the attitudes of urban consumers living in different geographical regions of Turkey (Marmara, Aegean, Mediterranean, Central Anatolia, Black Sea and Eastern Anatolia Regions) towards GM and GM foods were obtained and the region-based variances of these data were examined with a sampling error margin of 2.83% in consequence of the research carried out with the participation of the consumers (n = 1222) determined by means of implementing stratified random sampling method to houses and offices. Although different concerns and risks are in question, in all geographical regions there is a negative attitude against GM organism, technology and foods. However, these negative attitudes and viewpoints are based on different sources on the basis of geographical regions. The differences in the regions' socio-economic structures were determined as significant factors in this differentiation.

Keywords— Genetically modification, biotechnology, food, consumer, attitude

I. INTRODUCTION

NEW biotechnological methods to improve the quality and quantity of foods have been recently used to meet the demands of an increasing world population [1, 2, 3]. Since the mid-1990's, genetic modification (GM) is a rapidly growing and controversial method that can boost agricultural productivity, but the technology is not fully understood by the consumers [4]. There are also reports about "uncertainties" and "risks" of consuming GM foods and there has been a "doubt" that whether GM food causes allergies on human beings or damages the immune system [5]. On the other hand, when we consider the population growth in the world and its changing climate, it is expected that the production of GM foods will be increased [6], so that consumers' attitude on GM foods will be more important.

Consumers in different regions show different attitude toward adaption of GM food based on ethical ground, American consumers have neutral position toward GM food as they benefits of GM food for both producers and consumers [7]. However, most of the consumers living in developing countries have a negative position toward them [8, 9,10, 11, 12, 13, 14, 15].

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As for the studies carried out in Turkey, while there is a small number of studies intended to reflect the country-wide situation, mostly the attitudes and tendencies of people in different locations or position/duties (such as students, officials of the related ministry) were tried to be determined [6, 16, 17, 18, 19, 20].

In this study, it was aimed to produce descriptive information on consumers' awareness and attitudes concerning GM and GM foods by using the data obtained from face to face questionnaires directed to urban consumers living in several geographical regions of Turkey (Marmara, Aegean, Mediterranean, Central Anatolia, Black Sea and Eastern Anatolia Regions).

II. MATERIAL AND METHOD

A. Sampling Method and Selection of Sample

The target population of the research was formed by consumers over the age of 18 from all socio-economic groups (AB, C1, C2, DE), living in the city centers of Adana, Ankara, Antalya, Aydin, Bursa, Erzurum, Gaziantep, Istanbul, Izmir, Kayseri, Kocaeli, Samsun, Tekirdag or Trabzon cities of Turkey and dealing with the shopping of food needs of the house hold they live in. By considering the district and neighborhood distributions of the cities within the sample size distribution determined for the consumers residing in the centers of these cities a total of 1222 questionnaires were implemented.

The following formula was utilized for determining sample number:

$$n = \left(\frac{Z_{\alpha/2}}{d} \right)^2 p \cdot q \quad (1)$$

$$n = \left(\frac{1.96}{0.0283} \right)^2 0.5 \cdot 0.5 \cong 1200$$

n = Sample size,

$Z_{\alpha/2}$ = Confidence coefficient, (for a confidence of 95%, this coefficient was accepted as 1.96)

p = Rate of food consumers residing in the urban centers of 14 cities representing Turkey (Center; central locations with a population bigger than 50000). Taken as 0.5, since there was no preliminary information on the possible availability of the feature intended to be measured within the population.

$q = 1 - p$ = Rate of urban consumers

d = Accepted sampling error margin.

A sampling error of 2.83% (corrected error margin) was predicted in the study. As the general rule used in similar cases of sampling, it was accepted that $qq = pp = 0.5$. Accordingly the biggest possible sample size with a fixed sampling error and reliability level was obtained.

B. Questionnaire Design

A questionnaire was designed in order to meet the research objectives and pre-tested it on academics, food marketing experts and consumers. In the next stage, the questionnaire was piloted in March 2012 to 60 consumers by persons who conduct the survey at each field study area. The pilot survey indicated that no modification needed to the questionnaire and therefore the main survey was conducted in April and May 2012 as mentioned in the related section. The questionnaire form used for gathering research material was prepared in a comprehensive way by utilizing related sources and some previously conducted researches.

For the determination of the consumers constituting the sources of data, stratified random sampling method was employed. Necessary data were collected by means of the face-to-face questionnaire method. Interviews were made in houses and offices. Within the scope of the study that included all consumers living in the city centers of the mentioned 14 cities, it was aimed to conduct 1200 questionnaires for the sample size calculated with 95% significance level and 2.83% margin of error, and a total of 1222 questionnaires were conducted between the dates of 27 April - 11 May 2012. On average, each interview took approximately 20 minutes.

At the start of the interviews, the respondents were asked whether they shop for food, either by themselves or with others, and interviews with those who do not shop for food were discontinued. With the next question the respondents who work or who have relatives that work in the areas of advertisement, newspapers, TV/Radio marketing, market research and foodstuff sales and marketing were determined and the interviews started with such individuals were also discontinued. Next, the respondents who had participated to any other questionnaire concerning foodstuffs in the last month were from the scope of the research. The first question intended to determine demographic information inquired the consumers' age, and the interviews started with those who were younger than 18 were discontinued.

The data used in the preparation of this study were obtained from the answers given to the following questions of the questionnaire, the preparation and application of which is explained above:

- a. Quota (3 questions)
- b. Demographic information (5 questions)
- c. GMO awareness and consumption (total 3 questions with 2 open ended and 1 close ended questions)

C. Socio-economic Statute (SES) Determination

Another breakdown used in the study along with age and gender was SES. The reasons why SES grouping was found necessary are as follows:

- a) Income is a criterion that is determinative in terms of the status within the society,
- b) The need to interpret the received answers according to the social and economic classes the respondents are included in,
- c) The need to determine the behaviors of different status groups.

In the determination of SES groups, the classification technique created by ACNielsen ZET for Turkey was used. The SES tables used within the body of Nielsen are tables accepted and used by ESOMAR (European Society of Market Research). These tables were revised in 1994 within the body of Nielsen and adapted to the day's conditions and to Turkish people. The tables used for SES grouping consist of a matrix that groups people according to their professions and the education they received. Determination of the points such as the duration of education, years of education (for instance whether or not higher education is received) and whether or not education is completed is important in this grouping. Classification was made with six main groups as A (high), B (high-mid), C1 (medium - high), C2 (medium - low), D (low) and E (lowest).

D. Statistical Analysis

The collected data was summarized using descriptive statistics. To analyze differences between consumer types, the respondents were divided into three groups by using demographic variables and socio-economic statutes (SES); age, gender and SES. To determine the significance of differences between the sub-groups in the same consumer groups, t-test was applied by using SPSS Quantum programme (IBM, New York US).

III. RESULTS AND DISCUSSION

A. Demographic and socio-economic statute of sample population

The demographic information of the consumers that constitute the data source in the study are presented in Table 1. While 51.3% of the individuals interviewed were women (n=627), 48.7% were men (n=595). Among all participants, the 45+ group of age was the group that included the highest rate of participants (31.7%) and the average of age of the participants was determined to be 37.4 ± 13.7 . The age group that had the lowest number of participants was the age group of 45 - 54 (15.3%). No significant difference could be found among the geographical regions in terms of distribution of age groups ($P > 0.05$). While in general 52.0% of the participants shop for the household alone, the same rate was determined to be higher for Central Anatolia and Mediterranean regions than the Marmara and Aegean regions, and the rate of those who shop with the company of others in the Aegean region was

found out to be higher than the same rate determined for the regions of Central Anatolia, Mediterranean and Black Sea.

According to their socio-economic statuses (SES) consumers were gathered under 4 groups from high to low (AB: high, C1: medium - high, C2: medium - low, DE: low). While according to 2012 data of TUAD (Turkish Researchers' Association) the respective distribution of the Turkey-wide urban population to the socio-economic status groups of A, B, C1, C2, D and E is 5.00%, 10.0%, 24.0%, 31.0%, 22.0% and 8.00%, the same distribution of the participants of this study was determined as 6.80%, 14.1%, 22.9%, 17.6, 37.7% and 0.90%. While according to 2012 data of TUAD (Turkish Researchers' Association) the respective distribution of the Turkey-wide urban population to the socio-economic status groups of A, B, C1, C2, D and E is 5.00%, 10.0%, 24.0%, 31.0%, 22.0% and 8.00%, the same distribution of the participants of this study was determined as 6.80%, 14.1%, 22.9%, 17.6, 37.7% and 0.90%. In the Black Sea region, the number of the participants included in the E SES group is higher than any other region. On the other hand, the members of the D SES group in the region of Central Anatolia is higher than that in the regions of Marmara and Black Sea.

B. GM and GM foods awareness of consumers

The open ended question "What does the expressions GM and GM food mean to you" was directed to all participants. Examining the answers received (Table 2) shows that in all regions except for the Eastern Anatolia, the answer "rotten product" was received with a difference that is not significant. The participants from the Marmara region used the answer of "products with changed biology", which was in general the second most given answer, at a higher rate than the participants in the regions of Central Anatolia, Aegean and Black Sea. Examining those who gave the answer "products containing carcinogenic" shows that the urban consumers of the Mediterranean (30.7%) and Black Sea (32.2%) regions worry at a higher level than those in the other regions about the cancer risk in consequence of genetic modification ($P>0.05$). On the other hand, in comparison with those of other regions, the consumers living in the Aegean and Eastern Anatolia regions associated genetic modification more with fruits and vegetables. Examining all answers shows that, although there are different concerns and risks in question, in all geographic regions a negative attitude towards GM organism, technology and foods exists.

Although there is a negative attitude towards GM foods, the fact that substantial amount of urban consumers do not have any idea why these products are being produced is an indication of the confusion and information pollution experienced on the matter. As it can also be seen in Table 3, with a statistically significant difference than the consumers living in the coastal regions such as Aegean, Mediterranean and Black Sea regions ($P>0.05$), the urban consumers living in the Central Anatolia and Eastern Anatolia regions do not have any clear opinion on the topic. As for the urban consumers living in these coastal regions, they generally think that production of GM foods started due to their low costs.

Another point that is believed to be a reason for producing GM foods was long shelf life, according to the consumers living in the Central Anatolian region (26.5%).

C. GM-food Consumption

In general, most of the consumers interviewed in the study do not want to consume GM-foods (83.6%). Although the rates of those who want to consume these foods (9.1%) and those who are hesitant about it (7.3%) are approximate to each other, they exhibit significant differences in terms of geographical regions. This is particularly true when examining the hesitant consumers in the Aegean region (16.6%) and examining those who want to consume GM-foods in the Eastern Anatolian region (32.7%).

IV. CONCLUSION

In general, there is a negative attitude towards GM-organisms and foods in all regions. However, these negative attitudes and viewpoints may base on different sources on the basis of geographical regions. Considering that region-based differences were determined in the socio-economic status of the urban consumers of Turkey, it was concluded that the lower SES groups have a more moderate approach to the topic. Due to this reason, in the informative and awareness-raising efforts that may be made on GM-organisms and foods socio-economic structures and therefore regional factors should be taken into consideration.

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Table 2. Top of mind awareness when GMO recalled (%) (n= 1222)

Statement	Total	Marmara (n= 394)	Central Anatolia (n= 196)	Aegean (n= 145)	Mediterranean (n= 176)	Black Sea (n= 115)	Eastern Anatolia (n= 196)
		A	B	C	D	E	F
Rotten product	34.5	35.3>F	36.2>F	39.3>F	43.2>F	32.2>F	20.9
Products with changed biology	20.0	26.1>BC D	15.3	15.2	11.9	21.7>D	21.9>D
Products containing carcinogenic genes of fruit/vegetable	19.5	18.3>B	10.2	12.4	30.7>ABCF	32.2>ABC F	18.9>B
Manipulated products	13.8	10.2	13.8	20.0>AD E	10.8	7.00	23.5>ABD E
Untrustful products	12.8	10.9	17.9>ACF 7.10>AD F	8.30	17.0>AC	13.0	10.7
Chocolates	2.90	2.00	1.50	3.40>F	2.30	3.50>F	0.50
Negative products	2.90	2.80	1.50	3.40	3.40	2.60	3.60
Medicated products	2.00	3.30>C	10.0	0.00	1.70	2.60	2.00
Products containing chemicals	1.30	1.80	0.00	1.40	0.60	2.60>B	1.50
	1.10	1.50	1.50	0.70	0.00	2.60>DF	0.00

Items below 1% are not shown in the table. Proportions: Columns Tested (5% risk level) for break as geographical regions (A, B, C, D, E, F)

Table 3. Ideas on reasons of why GM foods started to production (n=1222)

Consumer Idea	Total	Marmara (n= 394)	Central Anatolia (n= 196)	Aegean (n= 145)	Mediterranean (n= 176)	Black Sea (n= 115)	Eastern Anatolia (n= 196)
		A	B	C	D	E	F
Being cheap	32.6	23.9	19.4	55.2>ABE F	57.4>ABEF	31.3>B	25.0
High nutritional value	2.70	4.60>E	2.00	1.40	1.70	0.00	3.10
High shelf life	16.7	16.0>C	26.5>ACF	6.90	18.2>C	20.9>C F	11.7
Harvesting products with desired features	16.5	21.3>BD	12.2>D	17.9>D	5.70	19.1>D	18.4>D
No idea	31.5	34.3>CD	39.8>CDE	18.6	17.0	28.7>D	41.8>CDE

Proportions: Columns Tested (5% risk level) for break as geographical regions (A, B, C, D, E, F)

Table 4. Attitude toward consuming GM foods (n=1222)

Question:	Total	Marmara (n= 394)	Central Anatolia (n= 196)	Aegean (n= 145)	Mediterranean (n= 176)	Black Sea (n= 115)	Eastern Anatolia (n= 196)
		A	B	C	D	E	F
Would you like to consume any GM foods?							
Yes	9.1	6.1	4.1	4.1	2.8	3.5	32.7>ABCDE
No	83.6	85.3>F	91.3>ACF	79.3>F 16.6>ABDE	93.8>ACF	93>ACF	61.2
Hesitant	7.3	8.6>D	4.6	F	3.4	3.5	6.1

Items below 1% are not shown in the table. Proportions: Columns Tested (5% risk level) for break as geographical regions (A, B, C, D, E, F)

Analysing some geotechnical properties of soils to predict the swelling potential in the left side of Mosul city using GIS methods

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Abstract ---The use of new technologies and programs in geotechnical analysis is emphasized in this paper . Soil properties in the left side of Mosul city (approximate area of 131 km²) were correlated with swelling behavior . The results of tests of more than 300 boreholes in the study area were collected from different resources . Statistical and geospatial analysis were using geographic information systems GIS programs . The out-put identified the most risk areas . Field visits show evidence of swelling effects on some buildings.

Keywords-- swelling, water content, dry density , GIS.

I. INTRODUCTION

SOME buildings in the Mosul city Suffer from cracks related to the presence of problematic soils as expansive soils [13] as shown in fig. (1).

The geological age of the left side of Mosul city is dated between lower Miocene and quaternary . The lower Miocene consists of lower Fares (Fatha) and upper Fares (Injana) . The quaternary consists of alluvium deposit and river terraces so it contains sands , clays and gravel which deposited by the river and the weathering of Injana . The geological map of left side of Mosul city shown in fig (2) [1].



(a)



(b)



(c)

Fig 1. Shows the cracks in districts (17) for the left side of Mosul city

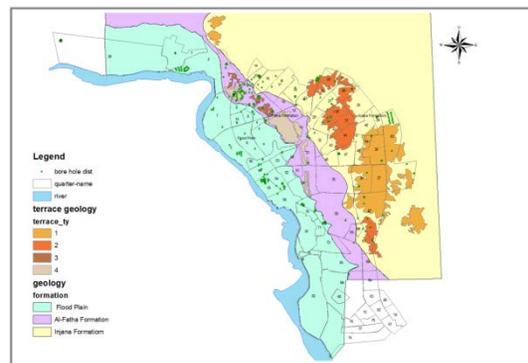


Fig 2 Geological map of the left side of Mosul city. Numbers indicate districts.

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