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CONSUMERS' KNOWLEDGE ABOUT FOOD AND FOOD SAFETY AND QUALITY ASSURANCE SYSTEMS

Abstract: *In this paper the results of survey conducted among 712 consumers in south-east Poland are presented. Respondents were asked to evaluate their level of knowledge about food. As a result it was shown that consumers usually assessed their knowledge as average or good. Women assessed their knowledge of food as better than men did. The most popular sources of knowledge about food among consumers are: the Internet (66.6% of indications) and television (58.8% of indications).*

Respondents were also asked about their knowledge about HACCP/ISO 22000. Most of them do not have knowledge about these systems. Most respondents declared that they don't know what HACCP or/and ISO 22000 is (28.5% and 20.5% of indications). Men more often than women declared the lack of knowledge about HACCP and ISO 22000.

Keywords: *food, knowledge, HACCP, ISO 22000*

1. Introduction¹

Nowadays consumers are very interested in the characteristics of food products they consume. Usually they do not have enough knowledge about food. To find information about food, they may use various sources, such as: television, the Internet, magazines etc. The knowledge about food influences food choices, and food choices are influenced by the tradition, culture etc. Consumers that have enough knowledge about food are able to distinguish between important information about food and the information which aim to persuade them to buy a food product. Attitudes towards food are shaped by knowledge. Important in raising awareness of food and informing consumers is the reliability and objectivity of

the contents of the information. At present the Internet is a very popular source of knowledge and it has a big impact on consumers. Based on the analysis (Kołłajtis-Dołowy and Schlegel-Zawadzka, 2009) (2004-2005 year) of 265 websites in Polish of food and nutrition, indicated that only 30% of the information posted on them can be considered as fully reliable. The American Dietetic Association has prepared a list of questions to assess the reliability of the information provided on the websites. The questions are as follows: 1. Does this page present the publisher or the sponsor? 2. Does the site is current? 3. Does the information refer to the reliable sources, such as peer-reviewed journals? 4. Is the information one-sided or presents many aspects of the subject? 5. Is the site prepared for marketing purposes or educational? 6. Do links to other addresses presented on the website complement the information presented or discussed with them? 7. Is there

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information about the author of the information and its source?

Besides the Internet the popular sources of information about food are: television, magazines, friends and family. Another aspect of this article is the knowledge about food safety assurance systems, such as HACCP and ISO 22000. HACCP is the acronym of Hazard Analysis and Critical Control Point (McDougall, 2011).

Food operators are obliged to implement and maintain food safety assurance systems (Kijowski and Sikora (eds.), 2003; Kołożyn-Krajewska and Sikora, 2010):

- 1) GMP (Good Manufacturing Practice).
- 2) GHP (Good Hygienic Practice).
- 3) HACCP (Hazard Analysis and Critical Control Point).

Systems GHP, GMP and HACCP are obligatory (based on the REGULATION (EC) No 852/2004 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 29 April 2004 on the hygiene of foodstuffs for all operators of food chain). Only the primary production is excluded from the obligation of implementing these systems (based on point 11 of this Regulation). Food operators may also implement ISO 22000 standard but this is not obligatory. Many food producers place the information about HACCP/ISO 22000 on the package of their products to inform consumers about the safety and high quality of their products.

In Poland in 2011, the vast majority (99%)

of animal products processing enterprises implemented GHP and GMP, and only 52% of them implemented the obligatory HACCP system. In the group of non-animal products processing enterprises, 89% of them applied GHP, 88% implemented GMP, and 60 % implemented HACCP (Morkis, 2012).

2. The sample and method

The anonymous questionnaire survey was carried out from September to December 2011. Before this, a pilot research was carried out to test the questionnaire. The questionnaire was built of 22 questions (one or more answers could be chosen, most of the questions were closed-type). The questionnaire was divided into three parts: the first part - general questions about the sources of the knowledge about food, self-assessment of the level of knowledge about the food. In the second part of the questionnaire respondents were asked about their main concerns related to food (for example: GMO, food additives), stages in food production in which food hazard may appear, their characteristics of food quality, the importance of food characteristics. In the third part respondents were asked about their behavior in the situation of food hazard. The results of this part of questionnaire are presented in this article. 712 consumers (convenience sample) took part in the survey from three districts of South-East Poland. The characteristics of respondents is shown in Table 1.

Table 1. Demographical characteristics of respondents.

Group characteristics	Group	Measure	Regions			Total
			Malopolskie	Podkarpackie	Lubelskie	
Gender	Female	N	246	78	144	468
		[%]	61.81	72.22	69.90	65.18
	Men	N	152	30	62	244
		[%]	38.19	27.78	30.10	34.27
Age	16-24 years	N	105	38	89	232
		[%]	26.38	35.19	43.20	32.58
	25-39 years	N	155	37	59	251
		[%]	38.94	34.26	28.64	35.25

	40-59 years	N	111	26	48	185
		[%]	27.89	24.07	23.30	25.98
	60+ years	N	27	7	10	44
		[%]	6.78	6.48	4.85	6.18
Education	Basic	N	74	11	13	98
		[%]	18.59	10.19	6.31	13.76
	Secondary	N	160	51	79	290
		[%]	40.20	47.22	38.35	40.73
	Higher	N	164	46	114	324
		[%]	41.21	42.59	55.34	45.51
Number of persons in household	1	N	27	5	3	35
		[%]	6.78	4.63	1.46	4.92
	2	N	68	17	38	123
		[%]	17.09	15.74	18.45	17.28
	3	N	82	18	47	147
		[%]	20.60	16.67	22.82	20.65
	4	N	119	41	72	232
		[%]	29.90	37.96	34.95	32.58
	5+	N	102	27	46	175
		[%]	25.63	25.00	22.33	24.58
Place of residence	City up 100.000 residents	N	116	33	88	237
		[%]	29.22	31.13	43.14	33.29
	City to 100.000 residents	N	164	33	43	240
		[%]	41.31	31.13	21.08	33.71
	Village	N	117	40	73	230
		[%]	29.47	37.74	35.78	32.30
Net income per member of family	Less than 800 zł	N	84	37	46	167
		[%]	21.59	34.58	22.33	23.46
	800-1200 zł	N	107	30	79	216
		[%]	27.51	28.04	38.35	30.34
	1201-1600 zł	N	81	14	41	136
		[%]	20.82	13.08	19.90	19.10
	1600+ zł	N	117	26	40	183
		[%]	30.08	24.30	19.42	25.70

Source: own research.

The test of independence χ^2 was used. This test is used to examine relationships between variables based on a nominal scale, and it is based on comparing the empirical distribution of the number of theoretical population distribution. The null hypothesis of independence of the two variables was rejected if the calculated value of χ^2 is higher than the threshold (the adopted significance level of $p = 0.05$). The independent variable (a feature specific to the respondents) affects the dependent variable (incidence of certain categories of answers to the question). The statistical

analysis of the results was performed using the statistical software Statistica 9.

3. Results

3.1. Sources of knowledge about food

Respondents were asked about the sources of knowledge about food they prefer. They could choose between: the Internet, television, family and friends, magazines, specialized magazines. According to the results of the survey the most popular sources of knowledge about food are the Internet (66.6% of indications) and television (58.8%

of indications) (Fig. 1). Respondents could also write down other sources of food knowledge. The widened the variety of answers of: doctors, school/university, own experiences. Another source of information about food can be food labels (Grunert. et

al., in press).

Unfortunately not always these popular sources of food knowledge provide consumers with the proper and objective information.

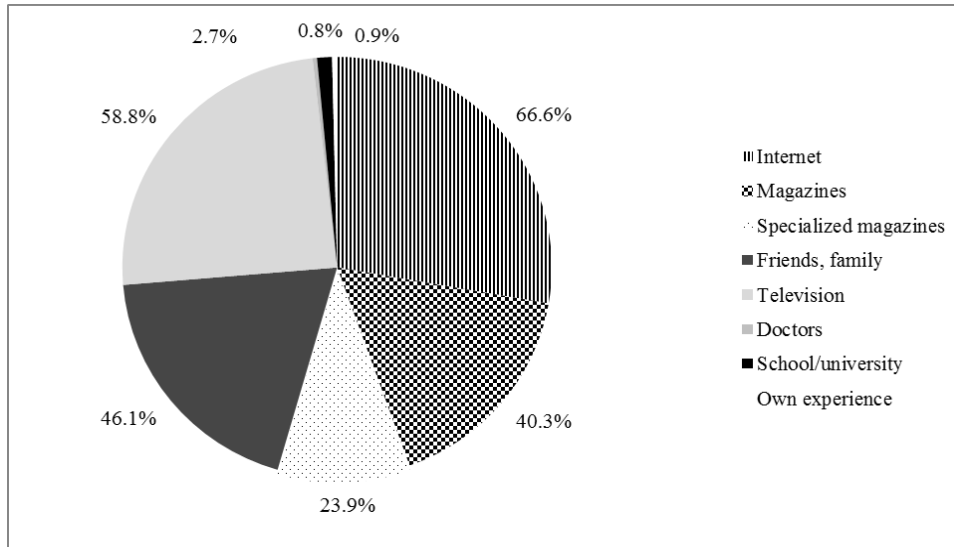


Figure 1. Sources of knowledge of food by consumers. Share of respondents who chose a particular answer. More than one answer could be chosen. Source own research

Based on χ^2 analysis it was found that preference for certain sources of knowledge about the food is varied according to gender,

age, region, level of education, the number of people in the household (Table 2).

Table 2. Summary of the results of the diversity of responses to the question about the sources of knowledge about the food, depending on the selected socio-demographic characteristics of respondents

Socio-demographic characteristics		Answers				
		Internet	Magazines	Specialized magazines	Friends and family	Television
Region	χ^2	1.08	2.4	8.37*	10.54*	3.75
	P _{limit}	0.583	0.302	0.015	0.005	0.153
Gender	χ^2	0.84	28.83*	3.61	0.79	0.17
	P _{limit}	0.358	0	0.057	0.375	0.677
Age	χ^2	41.35*	4.51	1.42	5.30*	2.86
	P _{limit}	0	0.105	0.491	0.07	0.239

Education	χ^2	31.62*	2.32	0.58	0.19	11.24*
	p _{limit}	0	0.313	0.749	0.91	0.004
Number of persons in household	χ^2	10.77*	4.35	1.5	3.4	21.28*
	p _{limit}	0.013	0.226	0.681	0.34	0
Place of residence	χ^2	5.36	0.54	1.58	2.75	0.6
	p _{limit}	0.069	0.765	0.453	0.252	0.742
Net monthly income per person in household	χ^2	1.22	1.03	2.7	3.23	7.01
	p _{limit}	0.747	0.793	0.44	0.357	0.072

Symbol * means that the hypothesis of independence of the variables to be rejected at a significance level of p = 0.05. Source: own research.

Internet as a source of knowledge about food was mainly chosen by respondents at the age of not more than 39 years. Respondents being older than 40 years to gain information about food mainly talk to their friends and family. Residents of Małopolska region also expressed the opinion that friends and family are their sources of knowledge about food. Also for young respondents friends and

family (as well as the Internet) are the sources of knowledge about food. Consumers taking part in the survey having higher education and members of a 4-person (or more) families also use the Internet to find information about food. Women more often than men use magazines to find information about food (Table 3).

Table 3. Analysis of answers about the sources of knowledge of food among respondents, based on socio-demographic characteristics

Socio-demographic characteristics		Answers									
		Internet		Magazines		Specialized magazines		Friends and family		TV	
		No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Region	Małopolskie					13.0	-13.0	-20.7	20.7		
	Podkarpackie					1.8	-1.8	10.8	-10.8		
	Lubelskie					-14.8	14.8	9.9	-9.9		
Gender	Female			-33.9	33.9						
	Male			33.9	-33.9						
Age	16-24	-23.2	23.2					-6.7	6.7		
	25-39	-14.2	14.2					15.4	-15.4		
	40+	37.4	-37.4					-8.7	8.7		
Education	Basic	16.7	-16.7							-2.8	2.8
	Secondary	14.8	-14.8							-16.3	16.3
	Higher	-31.5	31.5							19.0	-19.0
Number of persons in household	1-2	6.2	-6.2							19.0	-19.0
	3	12.9	-12.9							-1.5	1.5
	4	-14.6	14.6							4.5	-4.5
	5+	-4.5	4.5							-22.0	22.0

Source: own research.

Based on the results of research conducted in Poland in 2007 the most popular sources of

knowledge about food were (Żakowska-Biemans, 2011): magazines (69%) and TV

(65%). Friends and family and the Internet were indicated by 17% of respondents. Magazines were usually chosen by consumers having secondary or higher education. Respondents having basic education usually chose television as a source of knowledge about food. Taking into consideration the reliability of information provided, based on the results of Special Eurobarometer 354 „Food Related Risks”, the Poles as well as other citizens of UE expressed the opinion that the most reliable sources of knowledge of food safety were: family, doctors and consumer organizations.

Another good source of knowledge may be leaflets as shown by Soon-Mi *et al.* (2011).

3.2. Self-assessment of knowledge about food

Respondents were asked to assess their knowledge about food on a 5-point scale-1 meant very poor, 2-poor, 3-average, 4-good, 5-very good. Respondents assessed their knowledge as average (45.7%) and as good (40%) (Figure 2).

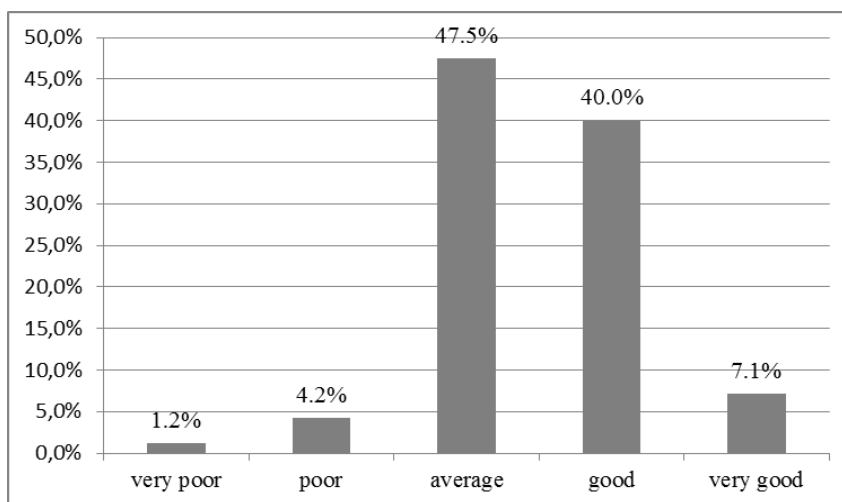


Figure 2. Self-assessment of knowledge about food on a 5-point scale.

Source: own research

Based on the mean marks it can be said that women usually assessed their knowledge about food as better than men did (women mean mark 3.54, men 3.35). According to

the variance analysis it is ascertained that self-assessment of the knowledge about food does not depend on the socio-demographic characteristics of respondents (Table 4).

Table 4. Results of the variance analysis of the self-assessment of knowledge by consumers

Socio-demographic characteristic	Segment	Miary statystyczne		Analiza wariancyjna	
		\bar{X}	s_x	F	$p_{graniczne}$
Region	Małopolskie	3.47	0.716	0.62	0.538
	Podkarpackie	3.55	0.716		
	Lubelskie	3.45	0.716		
Gender	Female	3.54	0.680	10.15*	0.001
	Male	3.35	0.845		
Age	16-24	3.52	0.669	0.66	0.524

	25-39	3.46	0.777		
	40+	3.46	0.786		
Education	Basic	3.43	0.815	0.31	0.743
	Secondary	3.48	0.735		
	Higher	3.49	0.736		
Number of persons in the household	1-2	3.43	0.673	0.83	0.490
	3	3.53	0.730		
	4	3.48	0.787		
	5+	3.44	0.771		
Place of residence	City of more than 100,000 residents	3.53	0.750	1.12	0.322
	City to 100,000 residents	3.46	0.760		
	Village	3.43	0.716		
Net monthly income per member of family	Less than 800zł	3.45	0.666	1.13	0.336
	800-120	3.44	0.753		
	1201-1600	3.44	0.728		
	1600+	3.56	0.816		

Source: own research

3.3. Knowledge about HACCP/ISO 22000

As it is mentioned in the introduction food safety is the priority characteristic of food. If the revision of food labels is made, it could be noticed that many producers put the

information about HACCP/ISO 22000 on the package of their products. However, based on the survey it can be said that many consumers do not have knowledge about HACCP and ISO 22000 (Fig. 3).

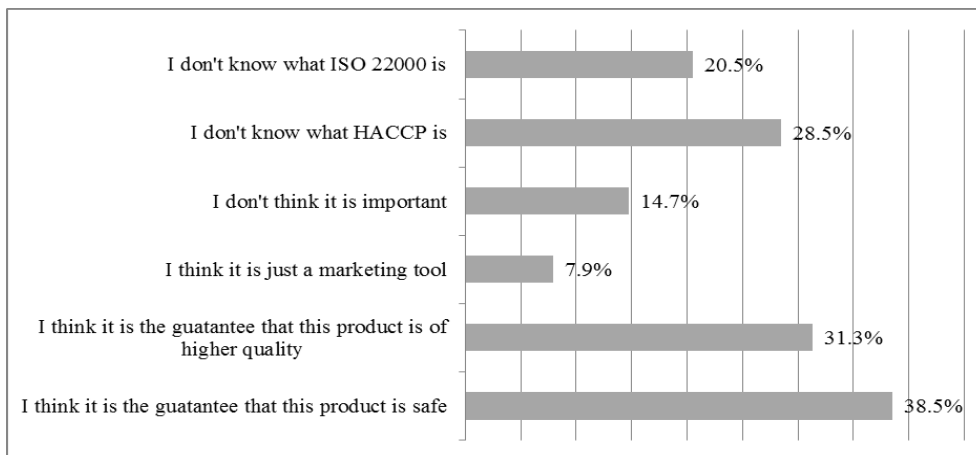


Figure 3. Perception of the information about HACCP/ISO 22000 and consumers' knowledge about these systems. Source: own research

Based on the results of this survey it can be said that consumers perceive the information about HACCP/ISO 22000 as positive. Based on research made by Iwamoto *et al.* (2003)

most of the consumers have a positive perception of HACCP. However, many consumers taking part in the presented research indicated that they don't know what

HACCP or/and ISO 22000 is (28.5% and 20.5% of indications). Men more often than women declared the lack of knowledge about HACCP and ISO 22000. Young consumers, residents of cities of less than 100,000 residents and residents of Małopolska region declared the lack of knowledge, too (Table 5). Most of consumers do not know what HACCP and ISO 22000 mean (Odwin and Badree, 2008;

Nowicki and Sikora, 2012; Agyei-Baffour, *et al.*, 2013).

It can be said that no matter if consumers know HACCP or ISO 22000, they perceive these systems in a positive way. Only 7.9% of indications stated for perceiving them just as a marketing tool, and 14.7% of indications stated for the unimportance of such information about HACCP and ISO 22000.

Table 5. Results of the variance analysis of the knowledge about HACCP/ISO 22000. Source: own research

Socio-demographic characteristics	Segment	I do not know what HACCP is		I do not know what ISO 22000 is	
		No	Yes	No	Yes
Region	Małopolskie	-17.5	17.5	-14.4	14.4
	Podkarpackie	1.8	-1.8	1.1	-1.1
	Lubelskie	15.7	-15.7	13.2	-13.2
Gender	Female	20.2	-20.2	25.9	-25.9
	Male	-20.2	20.2	-25.9	25.9
Education	Basic	-17.0	17.0	-14.8	14.8
	Secondary	-0.3	0.3	-1.3	1.3
	Higher	17.3	-17.3	16.1	-16.1
Number of persons in the household	1-2				
	3				
	4				
	5+				
	City of more than 100,000 residents			12.9	-12.9
	City to 100,000 residents			-10.4	10.4
	Village			-2.5	2.5

Source: own research

4. Conclusions

The level of knowledge about food is various. Most of the consumers self-assessed their knowledge about food as average and good. Women assessed their knowledge about food as better than men did (3.54 and 3.35). Women are usually more interested if food because they decide about the purchase

of food product and the diet.

Consumers may use various sources to collect information about food products. The most popular sources of knowledge about food among consumers are the Internet (66.6% of indications) and television (58.8% of indications). Other sources of knowledge of food mentioned by consumers are: friends and family, and magazines.

Although the knowledge of food (in general) among consumers can be assessed as good, consumers do not have much information about food quality and safety assurance systems.

Most of consumers do not know what HACCP and ISO 22000 mean. However, they think it is the guarantee of quality and safety of food they buy.

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