

EFFECT OF SOME SOCIO-ECONOMIC CHARACTERISTICS OF CONSUMERS ON THE FORMS OF FRUIT CONSUMPTION

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The purpose of the study was to establish the effect of certain characteristics of consumers, such as sex, age, education, income, family type and the source of incomes, on the choice of the form of fruit consumption and the frequency of fruit consumption in selected forms. The analysis was conducted on the basis of data obtained from surveys carried out among the inhabitants of Lublin in the years 2002, 2003 and 2006.

Results of those studies point out that the demographic and socio-economic characteristics significantly differentiated the consumers' preferences related to choosing the forms of fruit consumption and the frequency of their consumption. In 2006 the declarations of fresh fruit consumption were significantly differentiated by the age and sex, while the choice of juices and jams – by the age, and that of frozen fruit – by the sex, age and incomes. Consumers were shown to prefer fruit consumption above all in the fresh form as well as in the form of juice and drink and as ingredient of dishes and bakery goods. The indicated correlations between the consumers' characteristics and different forms of fruit consumption are subject to dynamic changes in time.

INTRODUCTION

It follows from the CBOS survey that health is what is desired by every second Pole to make their life successful [Boguszewski, 2006]. More than two thirds of the population of the European Union believe that healthy nutrition has a positive influence on health and disease prevention [Lappalainen *et al.*, 1998]. Over 78% of Lublin inhabitants are of the opinion that fruit are necessary or very important in human nutrition [Czernyszewicz, 2004]. This opinion is related to nutritional values of fruit. Fruit and vegetables are an important source of vitamins and minerals as well as dietary fibre. Fruit and vegetables consumed raw contain the greatest amount of vitamins since the processing, *i.e.* cooking, frying, *etc.* destroys vitamins. That is the reason why as many fruit and vegetables as possible should be eaten raw [Ziemlański, 1998]. However, the accelerating pace of modern life, and above all increasing affluence of the society, is followed by a greater demand for and a greater consumption of highly-processed products which are easy to use such as, for instance, juices and drinks, frozen food, jams, dried fruit and others. This is confirmed by observations and studies by Fuller [2001] conducted in rich countries as well as the analysis of trends related to fruit and vegetables carried out by Shewfelt & Henderson [2003]. These products are characterised by high income elasticity of the demand (consumption), which means high sensitivity of the consumers to the changes in incomes [Gulbicka & Kwasek, 2001]. Hua He *et al.* [1995] found out that although prices and incomes remain impor-

tant factors of the purchase of fresh fruit, the quality, nutritional values and comfort of their use will become dominating in the future.

The purpose of the studies was, therefore, to determine the effect of certain characteristics of the consumers, such as sex, age, education, incomes, family type and source of incomes, on the choice of the form of the consumption of fruit and the frequency of the consumption of fruit in selected forms.

MATERIAL AND METHODS

The analysis was conducted based on results of surveys carried out in the years 2002, 2003 and 2006 among the inhabitants of Lublin with a method of a direct survey. The pollsters distributed the questionnaires to selected people and after they filled in the questionnaires, the pollsters collected them personally. As a result, almost 100% of the questionnaires were collected and the percentage of the answers to particular questions was diverse, *i.e.* 99.5% to 99.7% of the answers was obtained in 2002, 97.0% to 99.3% in 2003 and 100% in 2006.

The sample of consumers in the studied periods was a quota selection reflecting the age structure of the inhabitants in five age groups (20-29, 30-39, 40-49, 50-59, over 60). In 2002, the studies covered 394 persons, in 2003 – 300 persons, and in 2006 – 506 respondents.

In 2002 and 2006, the persons surveyed answered the following question: "In what form do you eat fruit most often?". Among many forms of fruit consumption (fresh, salad, juice

and drink, jam, frozen fruit, dried fruit, ingredient of dishes), the respondents chose the ones most frequently eaten. In 2003, the person surveyed were asked to answer the following question: "How often do you eat fruit in different forms?". The answers were marked with a positional scale. The respondents evaluated each form of fruit consumption according to their preferences. The evaluation was made in a 5-degree ordinal scale (very often, often, from time to time, occasionally, never).

The analysis considered the variables explaining the consumers' sex, their age and education (4 groups: elementary, vocational, secondary, university level) and the biological family type (8 groups: childless marriage, family with 1 child, family with 2 children, family with 3 children, family with 4 and more children, single mother (father) bringing child up, childless single person, multi-generation family), monthly incomes per person in the family (4 groups: up to 300 PLN, 301-500 PLN, 501-1,000 PLN and over 1,001 PLN) and the source of incomes (6 groups in 2002: income from hired work, income from hired work and from private farm in agriculture, income from private farm in agriculture, self-employed or working in free professions income, pension, unearned source, and 5 groups in 2006: without incomes from only private farm in agriculture). The explained variables referred to the declaration of the form of fruit consumption and the frequency of fruit consumption in selected forms. The consumption of fresh fruit was considered, in the form of juice and drink, jam, frozen fruit, dried fruit, salad and as ingredient of dishes.

The analysis of the correlations was conducted on the basis of the coefficient of Pearson's linear correlation. In 2003, the correlations between the consumers' characteristics and the declarations of frequency of some forms of fruit consumption were also described by means of Spearman's rank correlation coefficient. Chi-square and V-Cramer statistics were used to find out whether a statistically significant variability of preferences occurred in the studied period. The null hypothesis concerning the independence of references referring to the choice of the form of fruit consumption was verified. The level of significance connected with the value of statistics allows to accept or to reject the null hypothesis saying about the independence of preferences on the date of the study. The analysis considered three levels of test significance: $\alpha < 0.05$, $\alpha < 0.01$ and $\alpha < 0.001$. The necessary statistical calculations were performed in the SAS system ver. 9.1.

The description of the dependences between the explained and explanatory variables was made by means of a model of a multiple linear regression.

Selected descriptive statistics of the consumers sample in the years 2002, 2003 and 2006 are provided in Table 1. Females dominated the surveyed groups (56-62%). The surveyed sample of consumers included 75-83% of people who had at least secondary education, and that number included 28-41% of those with university education. From 42 to 47% of the respondents declared monthly incomes per person in the family within the interval of 501-1,000 PLN, while 12-25% – as more than 1,001 PLN. In 7-13% of the respondent the income was up to 300 PLN per person in the family. For about 55% of the respondents surveyed in 2006, and for 37% in 2002, incomes from hired work were the major source of maintain-

ing the family, for 21-25% the major source of incomes were pensions, while for 15-23% it was self-employed. The highest percentage of the surveyed people originated from families with 2 and more children – 47-51%, and within that group the families with 2 children were most numerously represented – 28-31% of all those surveyed.

RESULTS AND DISCUSSION

Demographic as well as socio-economic factors remain important determinants in the purchase and consumption of fruit. They also affect the form of fruit consumption. Table 2 presents Pearson's coefficients of linear correlation illustrating the relation between those characteristics and declarations of different forms of fruit consumption. The choice of fruit consumption in the fresh form was significantly influenced by the sex and age of the consumers, and in 2002 also by education and the family type. The percentage of people stating fresh fruit consumption increased significantly along with the age (93.6% of the indications of people aged 20-29 and 100% of indications of people aged over 60). Men declared fresh fruit consumption more seldom than the women (94.4% and 98.0% of indications, respectively). Declarations of consumption of fruit juices and drinks was very strongly related to the age (with $\alpha < 0.001$), and in 2002 it was also connected with the incomes (with $\alpha < 0.01$) and the source of incomes (with $\alpha < 0.05$). In consecutive, older age groups, the percentage of people declaring fruit consumption in the form of juice decreased (28.8% of the indications in the age group 30-39, and 24.6% among 60 or more year-old people). It may result from a greater consumption of fresh fruit by older people and a smaller availability of the products due to smaller incomes of older people. In 2002, the consumption of fruit in the form of juice was declared by 30.8% of people with the income up to 300 PLN, and 57.4% of people with the income over 1,001 PLN. The change of the significance of the studied relations in 2006 as compared to 2002 pointed to a greater accessibility of those products to the consumers, independently of their incomes. Declarations of the consumption of jams were significantly correlated with age (with $\alpha < 0.05$), the consumption of fruit salads – with the education and the source of maintaining the family (with $\alpha < 0.05$), the consumption of dried fruit in 2002 – with the incomes, and in 2006 – with the sources of incomes (with $\alpha < 0.01$), whereas the consumption of frozen fruit was related with the sex, age (with $\alpha < 0.05$) and incomes (with $\alpha < 0.01$). Choosing the form of fruit consumption as ingredient of dishes was connected with the consumers' sex and the source of incomes.

To sum up, the sex had a significant effect on the declarations of fruit consumption in the form of fresh fruit and frozen fruit (with $\alpha < 0.05$). Men declared fresh fruit and frozen fruit consumption more seldom than the women. The age affected the choice of fresh fruit, juices and drinks, jams as well as frozen fruit (with $\alpha < 0.05$). In the case of fresh fruit, jams and frozen fruit the correlation was positive; hence, the frequency of indicating this forms of fruit consumption increased with age (respectively: 93.6%, 39.5% and 12.8% of the indications in the age group of 20-29, and 100%, 52.5% and 16.4% of the indications in the age group of 60 or more year-old

TABLE 1. Descriptive statistics of total consumers' sample and according to sex, age, education and income.

Specification	A – 2002 B – 2003 C – 2006	% of the total number of persons			Specification	A – 2002 B – 2003 C – 2006	% of the total number of persons		
		Total	Women	Men			Total	Women	Men
Total	A	100	62	38	Type of family				
	B	100	56	44	Childless marriage	A	9	9	10
	C	100	61	39		B	7	7	7
Age			C	8		7	10		
20-29 years	A	34	37	21	Family 1 child with	A	13	12	15
	B	36	34	37		B	13	12	15
	C	34	31	40		C	16	18	13
30-39 years	A	16	16	18	Family 2 children with	A	24	22	28
	B	15	17	12		B	27	30	25
	C	16	17	15		C	31	29	33
40-49 years	A	19	18	23	Family 3 children with	A	16	13	20
	B	20	21	18		B	15	16	15
	C	23	26	17		C	12	12	12
50-59 years	A	16	13	23	Family 4 and more children with	A	6	8	3
	B	14	14	15		B	8	7	8
	C	15	17	12		C	4	4	4
Over 60 years old	A	15	16	16	Single mother (father) bringing child up	A	3	3	2
	B	16	13	19		B	4	6	1
	C	12	10	16		C	4	6	1
Education					Childless single person	A	20	24	11
Elementary	A	8	10	6		B	20	18	24
	B	10	7	14		C	18	19	18
	C	5	5	4	Multi-generation family	A	10	9	11
Vocational	A	17	13	24		B	5	4	6
	B	12	14	9		C	7	5	9
	C	12	11	16	Source of income				
Secondary	A	34	36	25	Income from hired work	A	45	50	37
	B	50	52	47		B	42	45	37
	C	50	55	23		C	55	60	48
University level	A	41	41	45	Income from hired work and from private farm in agriculture	A	8	7	10
	B	28	27	30		B	5	5	5
	C	33	30	37		C	6	6	7
Monthly income per family member					Self-employed or working in free professions income	A	16	10	23
up to 300 PLN	A	13	16	10		B	20	19	22
	B	11	11	11		C	15	12	19
	C	7	8	6	Pension	A	27	29	27
301-500 PLN	A	33	31	33		B	24	22	26
	B	27	27	26		C	21	19	23
	C	21	25	16	Unearned source	A	4	5	4
501-1000 PLN	A	42	43	41		B	9	10	9
	B	43	46	47		C	3	3	3
	C	47	47	45	In the year 2002 N=394, in the year 2003 N=300, in the year 2006 N=504.				
Over 1001 PLN	A	12	10	16					
	B	16	16	16					
	C	25	20	33					

TABLE 2. Coefficient of Pearson's linear correlations for examined variables.

Declaration of fruit consumption in the forms (0-1) ¹	A – 2002 B – 2006	Sex	Age	Education	Type of family	Income in PLN per person/mos.	Source of income
Fresh	A	-0.113*	0.127**	-0.125**	-0.142**	-0.066	-0.044
	B	-0.097*	0.126*	-0.013	-0.078	0.047	-0.033
Juice or drink	A	0.070	-0.025	0.045	-0.016	0.156**	-0.115*
	B	0.001	-0.177***	0.070	0.044	-0.006	-0.037
Jam	A	-0.064	0.039	0.028	-0.011	-0.074	0.056
	B	-0.025	0.099*	-0.064	-0.027	-0.057	0.055
Ingredient of dishes	A	0.119**	-0.087	0.024	-0.061	0.081	-0.178***
	B	-0.067	0.075	-0.069	-0.011	0.016	0.092*
Salad	A	0.003	-0.008	-0.061	-0.016	-0.004	-0.038
	B	-0.048	0.056	-0.100*	0.031	0.034	0.092*
Dried	A	-0.084	0.048	-0.001	-0.010	-0.121**	0.029
	B	-0.073	0.026	-0.037	0.009	-0.064	0.125**
Frozen fruit	B	-0.104*	0.091*	-0.061	-0.034	-0.121**	0.048

¹ In what form do you eat fruit most often? 1 – 1- Indications, 0- No indications. Significance of correlations with * $\alpha < 0.05$; ** $\alpha < 0.01$; *** $\alpha < 0.001$.

people), while that of juices decreased with age (the correlation was negative), (Table 3).

In the studies conducted among the inhabitants of Sweden in the years 1992-1994, a the consumption of fruit and vegetable juices was found to be significantly affected by incomes and sources of incomes [Lindström *et al.*, 2001]. Independently of the sex, non-qualified manual labour position workers consumed twice as little juices as compared to the workers on non-manual labour position. Results of those studies are not comparable to the author's own studies. Despite that, both studies found out a significant effect of incomes and their sources on the consumption of fruit juices. Besides, declarations of fruit consumption in the form of juices in Lublin in 2006 were strongly related with the age of the respondents, while the studies conducted in Sweden did not confirm such an effect.

Education had a significant (but negative) impact on the declarations of fruit consumption in the form of salads (with $\alpha < 0.05$, respectively: 36.4% and 21.7% of the indications in the group of people with elementary and higher education), and in earlier years – of fresh fruit (respectively: 74.2% and 94.4% of the indications). The level of incomes was negatively correlated with the declaration of fruit consumption in the frozen form (which means decreased frequency of indicating this form of fruit consumption with increased incomes, respectively: 23.5% and 17.7% of the indications in the utmost income groups), and earlier in 2002 – in the form of juices and dried fruit (with $\alpha < 0.01$, respectively: 30.8% and 3.8% of the indications in the groups of people with the income up to 300 PLN, and 57.4% and 0.0% – over 1.001 PLN). The source of incomes was correlated with the declarations of dried fruit consumption (with $\alpha < 0.01$, respectively 7.1% and 16.7% of the indications in the group of people with the income from hired work and self-employment), in the form of salads and as ingredient of dishes (with $\alpha < 0.05$, respectively: 22.5% and 11.2% of the indications in the group of people with the income from hired work, and 31.0% and 19.0% from pensions), while in 2002 – also with the declarations of juices and drinks consumption (respectively 36.3% and 51.7% of the indications in the group of people with the income from a pension and self-employment). The relations presented here point to their dynamic character and to changes proceeding in the strength and direction of the effect in the studied period. In addition, they could also partly result from the differences in the characteristics of the studied consumer samples in the years 2002 and 2006.

The relations between the consumer characteristics (explanatory variables) and the declarations of the form of fruit consumption (explained variables) in 2006 were described in the forms of the following equations of linear regression:

$$(1) \text{ Fresh fruit consumption} = 0.947 + 0.019 \times \text{age} - 0.013 \times \text{source of incomes}$$

$$(2) \text{ Fruit consumption in the form of juice or drink} = 0.818 - 0.058 \times \text{age}$$

$$(3) \text{ Dried fruit consumption} = 0.108 - 0.051 \times \text{age} + 0.032 \times \text{source of incomes}$$

$$(4) \text{ Fruit consumption as ingredient of dishes} = 0.079 + 0.027 \times \text{source of incomes}$$

$$(5) \text{ Frozen fruit consumption} = 0.379 - 0.076 \times \text{age} + 0.028 \times \text{age} - 0.057 \times \text{incomes}$$

$$(6) \text{ Fruit consumption in the form of jam} = 0.528 + 0.037 \times \text{age} - 0.049 \times \text{incomes}$$

$$(7) \text{ Fruit consumption in the form of salad} = 0.287 - 0.063 \times \text{education} + 0.043 \times \text{incomes} + 0.026 \times \text{source of incomes}$$

It follows from equation 2 that in 2006 the declarations of fruit consumption in the form of juice or drink decreased with age by 0.058 point (in the scale 0-1). In the following groups which were differentiated in respect of the source of incomes, the declarations of fruit consumption as ingredients of dishes increased by 0.027 point (equation 4). In a given age group the declarations of fruit consumption in the form of jam decreased with moving to the next (higher) income group by 0.049 point, while in a given income group the declarations of this form of fruit consumption increased by 0.028 point together with moving to the next age group (equation 6). In a female or male group the declarations of fruit consumption in the dried form increased with moving to the next group distinguished due to the source of incomes by 0.032 point in the scale from 0 to 1, whereas in a given group with the incomes coming from the same source the declarations of fruit consumption in the dried form decreased together with moving from the female to the male group by 0.051 point (equation 3).

The coefficients in Table 4 present the relation between the declarations of frequency of fruit consumption in different forms (expressed in the scale 1-5) with certain characteristics of the consumers in the year 2003. It follows from those data that the sex affected the declarations of frequency of fruit consumption in the fresh form, in the form of juice or drink and as ingredient of dishes, while age and education affected the declarations of frequency of fruit consumption

TABLE 3. Preferences for various forms of fruit consumption according to age of respondents in the year 2006 (indications in per cent).

Fruit consumption forms	Total	20-29 years	30-39 years	40-49 years	50-59 years	Over 60 years old
Fresh	96.6	93.6	95.0	99.1	98.7	100.0
Juice or drink	66.7	76.2	68.8	63.7	55.8	55.7
Jam	47.6	39.5	59.0	47.8	58.4	52.5
Ingredient of dished	13.9	9.9	13.8	17.7	15.6	16.4
Salad	27.6	23.8	28.8	26.5	39.0	24.6
Dried	10.9	10.5	10.0	11.5	10.4	13.1
Frozen fruit	18.8	12.8	18.8	23.0	27.3	16.4

'In what form do you eat fruit most often?'

TABLE 4. Coefficient of Pearson's linear correlations and Spearman's correlations for demographic and socio-economic characteristics of the consumers and declarations of frequency of fruit consumption forms in the year 2003.

Declarations referring to frequency of fruit consumption forms (1-5) ¹	Kind of statistics	Sex	Age	Education	Type of family	Income in PLN per person/mos.	Source of income
Fresh	A	0.193***	-0.040	0.016	-0.123**	0.067	-0.060
	B	0.177**	-0.031	0.046	-0.118*	0.071	-0.075
Juice or drink	A	0.136**	0.279***	-0.118*	0.052	-0.002	0.034
	B	0.133*	0.269***	-0.059	0.056	-0.002	0.037
Compote	A	-0.064	-0.054	0.066	-0.007	0.151**	-0.030
	B	-0.051	-0.040	0.068	-0.019	0.144**	-0.045
Jam	A	0.009	-0.011	-0.002	0.049	0.094	-0.049
	B	0.003	-0.010	0.032	0.047	0.120*	-0.062
Fruit soup	A	-0.087	-0.131*	0.110*	0.032	0.046	0.006
	B	-0.081	-0.127*	0.100	0.006	0.064	-0.002
Fruit salad	A	0.009	0.039	0.014	0.178**	0.007	0.019
	B	0.018	0.051	0.040	0.169**	0.016	0.041
Ingredient of dished	A	0.204***	0.233***	-0.156**	0.140**	-0.049	0.055
	B	0.199***	0.218***	-0.083	0.137**	-0.044	0.037
Dried fruit	A	0.060	0.023	0.022	0.002	-0.002	0.023
	B	0.059	0.003	0.042	-0.004	0.013	0.027

'How often do you eat fruit in different forms?' A – Coefficient of Pearson's linear correlation; B – Coefficient of Spearman's correlation. Significance of correlations with * $\alpha < 0.05$, ** $\alpha < 0.01$, *** $\alpha < 0.001$ ¹ 1- very often, 2- often, 3- from time to time, 4- occasionally, 5- never.

tion in the form of juice or drink, fruit soup and as ingredient of dishes. The type of respondent family significantly influenced the choice of the frequency of the consumption of fresh fruit, fruit salads and fruit as ingredient of dishes, while the level of incomes influenced the declaration of frequency of consuming compotes. It follows from the studies by CBOS that 37% of the Polish population would have cherry or strawberry compote to lunch, while 14% would prefer juice (most frequently, orange juice). In turn, 13% of the Polish population would like fruit for dessert [Lewandowska, 2005].

Independently of the enumerated demographic and socio-economic characteristics of the surveyed consumers, according to the respondents' declarations, the greatest frequency of consumption was characteristic of fresh fruit (4.5 in the scale 1-5), juice or drink (3.9) and fruit consumption as ingredient of dish and bakery products (respectively, 3.6 and 3.3). Fruit soups and dried, crystallized and smokes fruit was consumed the most rarely by the respondents (Figure 1).

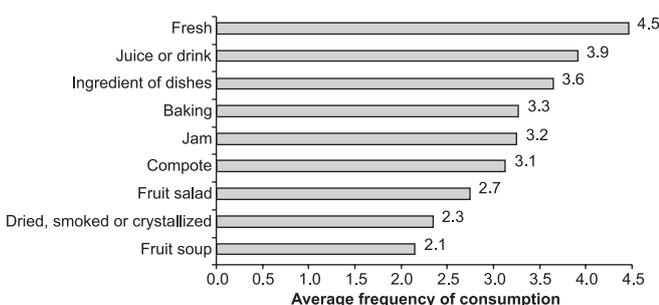


FIGURE 1. Average frequency of fruit consumption in different forms in 2003 (in the scale 1-5, where: 5- very often, 4- often, 3- from time to time, 2- occasionally, 1- never).

TABLE 5. Value of Chi-Square statistics and Cramer's V and *p*-value for variables describing preferences for the form of fruit consumption in the years 2001 and 2006.

Declaration of fruit consumption forms (0-1)*	Chi-Square statistics	<i>p</i> -value	Cramer's V
Fresh	23.474	<0.0001	0.162
Juice or drink	37.942	<0.0001	0.206
Jam	25.206	<0.0001	0.168
Ingredient of dished	9.822	0.0017	0.105
Salad	3.393	<0.0001	0.199
Dried	21.236	<0.0001	0.154

*In what form do you eat fruit most often? * 1- Indications, 0 - No indications

A similar sequence of the popularity of the forms of fruit consumption in reference to apples and oranges was obtained by Licznar-Małańczuk *et al.* [2001] and Kurzawiński [2001]. In their studies, fresh apples and oranges were consumed the most frequently and independently of the sex, age, education nor other socio-economic characteristics. Interesting observations pertaining to the consumption of apples were made by Perez *et al.* [2001] in the USA. While analysing data concerning apple consumption, it was found out that the form of consumption was related to the region, race, sex and age and incomes of the consumers. In the last three decades apple consumption in the USA increased, and in recent 20 years the consumption of processed apples considerably exceeded the consumption of fresh apples. Juices (74%), canned fruit (17%), dried fruit (4%), frozen fruit (3%) and other forms had the highest share in the consumption of processed apples. In the 1990's the greatest increase in the con-

sumption of processed apples *per capita* referred to juices, frozen and dried fruit.

It was stated on the basis of the Chi-Square and Cramer statistic values and probability that the declarations of fruit consumption in selected forms depended upon the time of the research and differed significantly between the years 2002 and 2006 (Table 5). The changes in preferences may be affected by the changes of the supply, incomes and prices of the analysed products and substitute products, as well as the advertisement and education of the consumers affecting the change of needs.

CONCLUSIONS

1. Demographic and socio-economic characteristics of the consumers significantly diversified the form of fruit consumption. Sex significantly affected the declarations of fruit consumption in the fresh and frozen forms, age – affected the declarations of fresh fruit, juice or drink, jam and frozen fruit consumption, education had a significant relation to the declarations of fruit consumption in the form of salad, while the level of incomes was negatively correlated with the declarations of frozen fruit consumption.

2. Consumer characteristics also differentiated the declarations of frequency of fruit consumption in various forms. Sex significantly affected the frequency of fruit consumption in the fresh form, as juice or drink and as ingredient of dishes, age and education influenced the frequency of fruit consumption in the form of juice or drink, fruit soup and as ingredient of dishes, while the type of the respondents families significantly influenced the declarations of frequency of the consumption in the fresh form, fruit salad and as ingredient of dishes, and finally, the level of incomes had an effect on the frequency of the consumption of compotes.

3. The consumers in Lublin most often consumed fresh fruit, fruit in the form of juice or drink and as ingredient of dishes and in the bakery goods. Fruit in fruit soups, salads and dried fruit were consumed the most rarely.

4. The correlations found out between the consumers socio-economic characteristics and the indicated forms of fruit consumption undergo dynamic changes in the character, strength and direction of effect.

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