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THE STATE OF KNOWLEDGE ON FOOD SAFETY AND FOOD WASTE AMONG YOUNG CONSUMERS – PART 2

S u m m a r y

Background. Nutrition is one of the most important lifestyle factors that can affect health and disease development. Eating behavior that takes into account proper hygiene habits can be an effective method of preventing most food-borne diseases. With the dynamic development of global food markets and the increased availability of food, especially in high developed countries, there is a progressive phenomenon related to irrational food management at all stages of the food chain. This has both environmental, economic, ethical and social consequences. The aim of the study was to determine the level of knowledge of young consumers about food safety and food-related conditions, as well as food losses and waste.

Results and conclusions. Among the respondents, the biggest group comprised young consumers aged 15 ÷ 26, living mainly in rural areas. The object of interest of the research team was to determine the state of knowledge about food safety and food, the impact of food loss and waste on food safety, and how to reduce the risk of purchasing and consuming unsafe food. In addition, it was determined what type of information is checked on packages when shopping. It was shown that young consumers are nutritionally knowledgeable and pay attention to food labels. Consideration should be given to educating students about safety, the quality of the food they choose, and reducing food waste and its consequences.

Keywords: food safety, education, young consumers, food waste, food labels

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Introduction

Nutrition is one of the most important lifestyle factors that can influence health status and the development of diseases [30]. Eating behaviors that incorporate good hygiene habits can be an effective method of preventing most foodborne diseases. Despite the risks associated with the increasing incidence of foodborne diseases, children and adolescents are at greater risk of developing infections and serious health consequences, as are pregnant women, the elderly and immunocompromised individuals [9]. Food security is one of the basic human needs stemming from the need to access and feel safe with food [15, 17,27]. Its importance, according to the Food and Agriculture Organization of the United Nations (FAO), is defined as a situation in which all people at all times have physical, social and economic access to sufficient, safe and adequate quality food to meet their nutritional needs and preferences for leading an active and healthy life [10]. Physical access to food is determined by the supply of food. Economic access to food is determined by one's resources, mainly financial ones. Social access to food is determined by membership of social groups with specific dietary preferences due to, among other things, geographical location, culture, religion [18,22]. When it comes to food security, it is also impossible not to mention food safety, which is currently a major challenge and an important factor that consumers worldwide take into account when making food choices [20]. According to Keener [13], food safety is defined as “the biological, chemical, or physical status of food that will permit its consumption without incurring excessive risk of injury, morbidity, or mortality”. In recent years, there have been a number of adverse phenomena related to food adulteration and an increase in food contamination, with a consequent reduction in the level of food quality and safety and a decrease in consumers' trust [20].

According to estimates by the United Nations Department of Economic and Social Affairs, the number of people on Earth will reach 9.8 billion in 2050 and 11.2 billion in 2100 [28]. With the dynamic development of global food markets and the increased availability of food, especially in highly developed countries, there is a progressive phenomenon related to food irrationality at all stages of the food chain. These have both environmental, economic, ethical and social consequences [23, 32]. According to the report of the United States Department of Agriculture, “food loss” means “the amount of edible food that is available to humans after harvest consumption but is not consumed for any reason; includes cooking loss and natural shrinkage (e.g. loss of moisture); losses due to mold, pests or inadequate climate control; and plate waste” [29].

Addressing food loss and waste is one of the objectives of sustainable development directly correlated with the need to educate society as a basis for improving the quality of life and being able to find innovative solutions for the 21st century [19, 24]. As consumption increases, water and other natural resources are also wasted [13]. Wa-

ter is an essential element for the proper functioning of the entire system [26]. Although an increasing number of consumers show interest in the impact of purchasing decisions on environmental degradation, they often do not exhibit behavior that promotes the right social attitude. The observed discrepancy is referred to as the 'attitude-behavior gap' and is currently a major challenge for the development and promotion of sustainable consumption [25]. Information on food labels is intended to convey information about the quality or freshness of the product [13].

The aim of the study was to determine the level of knowledge of young consumers about food safety and food-related conditions, as well as food losses and waste.

Material and methods

The publication is a continuation of the research conducted by Mikulec et al. [19] on the state of knowledge of young consumers about food safety and food waste. The cross-sectional survey was conducted between September and December 2022 using the CAWI (*Computer-Assisted Web Interview*) data collection technique. Anonymity and confidentiality of data was ensured. The survey adhered to the ethical principles of non-violence, voluntariness, justice and autonomy, in line with the accepted principles of the 2013 Declaration of Helsinki [31].

The survey included questions about the socio-demographic data of the study participants. The second part of the survey included questions about issues related to food security (definition, factors threatening food security in the world). The next part of the survey concerned issues related to food safety and food losses and waste around the world. The respondents were asked about the definition and factors threatening food quality and safety. The questions addressed to the respondents also included issues regarding the 2030 Agenda for Sustainable Development and the 2030 Sustainable Development Goals. The respondents answered questions about the perception of food waste, the scale of its occurrence, the causes and groups of food products most frequently wasted. An indispensable factor related to food waste and its scale is also the ability to read and interpret food labels. The respondents answered questions about their ability to read food labels and information to which they pay particular attention. The questions were differentiated in terms of answer options - single- and multiple-answer questions.

The research sample was recruited from among young people in Poland via advertisements on social media, including discussion forums. People interested in voluntary participation in the study were provided with electronic access to the survey questionnaire if they met the only inclusion criterion, which included the age range from 15 to 29 years. The study participants gave informed consent to participate in the study. For 119 respondents under the age of 18, consent was sought from their parent or legal guardian. Of the 664 completed questionnaires collected, 640 were qualified for further

statistical analysis. The remaining part of the collected results was rejected due to errors. The study used a self-administered questionnaire consisting of closed-ended questions, covering various aspects related to consumer awareness of food safety and waste, and behavior when making food choices.

The respondents were required to provide information such as gender, age, education level, place of residence and household size. The research part of the questionnaire included questions on the respondents' knowledge of food safety and the factors affecting it, food waste and the information provided to consumers through food labels.

The collected data was analyzed using Statistica 13.3 (Tibco, Krakow, Poland). The study results were presented using percentage distribution (%), indicating the proportion of each score (% of indications). By age, the respondents were divided into two age groups 15 ÷ 19 (the age at which young people attend secondary school) and 20 ÷ 29 (the age at which young adults potentially start their independent lives). To assess differences between groups categorized by education, age and place of residence, the Chi-square test of independence with Yates correction was employed. A statistical significance level of $p < 0.05$ was considered for all analyses.

Results and discussion

The characteristics of the study group of the respondents are presented in Table 1. The largest proportion of participants in the study were women (72.3 %). Taking into account the age ranges, the most numerous groups of participants were respondents aged 15 ÷ 19 years and 20 ÷ 29 years, respectively. Rural residents (61.4 %) attending secondary school predominated.

The subject of interest to the research team was to determine the state of knowledge about food security of the respondents surveyed (Table 2). The most frequently indicated responses among the respondents with primary and post-primary education were "is a situation in which all people have physical, social and economic access to sufficient, safe food at all times" and "is the satisfaction of people's nutritional needs enabling them to live active and healthy lives", which is in line with the definition of the International Food and Agriculture Organization [10]. Among the respondents with higher education, the second most frequently indicated response was "is constant access to food in sufficient quantities to ensure its diversity". The most frequently indicated response among the respondents with primary education was "it is meeting people's nutritional needs to enable them to live active and healthy lives"; the response was statistically significant ($p < 0.05$).

Table 1. Characteristics of the study sample

Tabela 1. Charakterystyka badanej grupy

Parameters / Parametr	Number of Respondents [n] / Liczba Respondentów [n]	Percentage [%] / Odsetek [%]
Gender / Płeć		
Female / Kobiety	463	72.3
Male / Mężczyźni	177	27.7
Age [years] / Wiek [lata]		
15÷19	275	43,38
20÷29	365	56,62
Place of residence / [Miejsce zamieszkania]		
Countryside / Wieś	393	61.4
City / Miasto	247	38.6
Education / Wykształcenie		
Primary school / Podstawowe	198	30.9
Secondary school / Średnie	314	49.1
Higher education / Wyższe	128	20.0

Table 2. % distributions of answers by education, age and place of residence of respondents - defining food security (results do not add up to 100% because of multiple choice question)

Tabela 2. % rozkład odpowiedzi według wykształcenia, wieku i miejsca zamieszkania ankietowanych – definiowanie bezpieczeństwa żywnościowego (wyniki nie sumują się do 100% - pytanie wielokrotnego wyboru)

Bezpieczeństwo żywności to / Food safety is	Education [%] / Wykształcenie [%]			<i>p</i> *	Age in years [%] / Wiek w latach [%]			Place of residence [%] / Miejsce zamieszkania [%]		
	Primary school / Podstawowe	Secondary school / Średnie	Higher education / Wyższe		15÷19	20÷29	<i>p</i>	Countryside / Wieś	City / Miasto	<i>p</i>
A	54.5	70.0	65.6	<0.01	56.4	70.4	<0.01	61.8	68.4	0.09
B	55.5	39.5	38.3	<0.01	54.9	36.1	<0.01	49.1	36.4	<0.01
C	38.9	45.8	46.9	0.22	41.4	45.7	0.24	41.5	47.7	0.14
D	18.7	13.7	12.5	0.22	17.1	13.4	0.28	16.5	12.5	0.21

*Chi²

Explanatory notes / objaśnienia:

A – is a situation in which all people have physical, social and economic access to sufficient, safe food at all times; B – is the satisfaction of people's nutritional needs enabling them to live active and healthy lives; C – is the constant access to food in sufficient quantities to ensure its diversity; D – is the satisfaction of people's food preferences.

A – to sytuacja, w której wszyscy ludzie przez cały czas mają fizyczny, społeczny i ekonomiczny dostęp do wystarczającej, bezpiecznej żywności; B – to zaspokojenie potrzeb żywieniowych ludzi umożliwiające prowadzenie aktywnego i zdrowego życia; C – to stały dostęp do żywności w wystarczających ilościach, zapewniających jego różnorodność; D – to zaspokojenie preferencji żywieniowych ludzi.

Among the factors posing threats to food security (Table 3), the youngest respondents most frequently indicated food prices (52.0 %) and food loss and waste (34.8 %). The indicated factors were statistically significant ($p < 0.05$). For those with secondary education, the highest percentage also indicated food prices (48.4 %) and the growth of areas with water scarcity (40.4 %). The same factor was also a concern among the respondents with a tertiary education (45.3 % of indications). These factors are indirectly linked to climate change with consequent constraints on supply chains and price increases [18]. In September 2021, the United Nations Food Systems Summit (UNFSS) took place in New York. The focus was on the 'three Cs' that are disrupting food systems and threatening recent progress in alleviating hunger, malnutrition and undernutrition: global environmental climate change, COVID-19 and conflict. Delegates from nearly 183 countries were united on the need to make the changes necessary to achieve the Sustainable Development Goals. The three C's interact with five other mediators on which food systems depend: the geopolitics of our global food systems, fertilizers, finance, feed and fuel. Our global food system is relatively vulnerable to each driver or mediator. However, all can interact to amplify further impacts on people, their health and their diets. For example, reduced food availability has financial implications (and vice versa) [12].

Table 3. Factors most threatening to food security by education level, age and place of residence (i.e. multiple responses)

Tabela 3. Czynniki najbardziej zagrażające bezpieczeństwu żywnościowemu według wykształcenia, wieku i miejsca zamieszkania (j.w. wielokrotna odpowiedź)

Czynniki / Factors	Responses [%] / Odpowiedzi [%]									
	Education [%] / Wykształcenie [%]				Age in years [%] / Wiek w latach [%]			Place of residence [%] / Miejsce zamieszkania [%]		
	Primary school / Podstawowe	Secondary school / Średnie	Higher education / Wyższe	p^*	15÷19	20÷29	p	Countryside / Wieś	City / Miasto	p
Global population growth / Wzrost liczby ludności na świecie	23.7	24.8	30.5	0.37	23.3	27.4	0.4	21.4	32.4	<0.01
Increase in global demand for food / Wzrost globalnego zapotrzebowania na żywność	32.3	32.8	28.9	0.62	33.5	28.8	0.3	29.3	33.21	0.34

Changes in consumption patterns / Zmiany we wzorcach konsumpcji	8.5	7.0	6.25	0.69	7.64	7.1	0.8	8.1	6.1	0.41
Food prices / Ceny żywności	52.0	48.4	34.4	0.01	54.9	40.5	<0.01	51.1	39.7	0.01
Increase in areas with water shortages / Wzrost obszarów z niedoborem wody	24.7	40.5	45.3	0.01	26.18	44.5	<0.01	33.6	41.3	0.06
Reduction in land availability / Ograniczenie dostępności gruntów	9.1	12.4	14.1	0.33	9.1	13.7	0.13	12.0	11.3	0.81
Climate change / Zmiany klimatu	29.8	36.9	41.4	0.08	28.4	41.1	<0.01	35.1	36.4	0.73
Loss of biodiversity / Zanikanie bioróżnorodności	4.5	8.9	9.8	0.12	4.7	9.9	0.02	7.4	8.1	0.88
Food loss and waste / Straty i marnotrawstwo żywności	34.8	35.7	21.9	0.01	35.3	30.7	0.20	33.6	31.2	0.58
Food insecurity / Brak bezpieczeństwa żywności	15.7	15.6	13.3	0.80	17.4	13.4	0.27	15.0	15.4	0.98
Pandemics / Pandemie	19.2	7.3	10.2	19.19	16.0	8.2	<0.01	12.7	9.7	0.24
Wars / Wojny	33.8	24.2	32.0	33.8	31.64	26.6	0.24	30.8	25.5	0.15

*Chi²

As for the questions, the respondents were also asked to answer about the meaning of the terms "food security" and "food safety" (Table 4). The vast majority of respondents, regardless of their level of education and place of residence, indicated that they knew the differences in the beforementioned terms and the differences were statistically significant ($p < 0.05$). The results of surveys conveyed among American teenagers indicate that young people are increasingly seeking for information on aspects of food safety on the Internet. This trend will be observed and the study participants themselves declared a greater attachment to an interest in this form of information provision [4].

Table 4. Knowledge of the terms of food safety, food security, food loss and food waste, and the relationship between food waste and food security distributions of answers by education, age and place of residence of respondents (single choice question).

Tabela 4. Znajomość określeń bezpieczeństwo żywności, bezpieczeństwo żywnościowe, straty i marnowanie żywności oraz związek pomiędzy marnowaniem żywności a bezpieczeństwem żywnościowym – rozkład odpowiedzi według wykształcenia, wieku i miejsca zamieszkania ankietowanych

	Education [%] / Wykształcenie [%]				Age in years [%] / Wiek w latach [%]			Place of residence [%] / Miejsce zamieszkania [%]		
	Primary school / Podstawowe	Secondary school / Średnie	Higher education / Wyższe	<i>p</i> *	15÷19	20÷29	<i>p</i>	Countryside /Wieś	City / Miasto	<i>p</i>
In your opinion, do food safety and food security mean the same thing? / Czy Twoim zdaniem bezpieczeństwo żywności i bezpieczeństwo żywnościowe znaczą to samo?										
Yes / Tak	44.4	18.1	15.6	<0.01	40.7	14.5	<0.01	31.3	17.0	<0.01
No / Nie	55.6	81.9	84.4		59.3	85.5		68.7	83.0	
Are you familiar with the concept of food loss and waste? / Czy znasz pojęcie strat i marnowania żywności?										
Yes/ Tak	85.3	88.5	83.6	0.32	85.8	87.1	0.59	84.7	89.5	0.11
No/ Nie	14.7	11.5	16.4		14.2	12.9		15.3	10.5	
In your opinion, do food loss and waste have an impact on food security? / Czy straty i marnowanie żywności mają Twoim zdaniem wpływ na bezpieczeństwo żywnościowe?										
Yes/ Tak	80.8	91.7	90.6	<0.01	82.5	92.9	<0.01	87.5	89.1	0.65
No/ Nie	19.2	8.3	9.4		17.5	7.1		12.5	10.9	

*Chi²

One third of food produced worldwide is lost (post-harvest and pre-consumption) or wasted (post-consumption) throughout the food supply chain from production to consumption [7]. The respondents were also asked about the aspect related to food waste. When asked "Are you familiar with the concept of food loss and waste" and "Do you think food loss and waste have an impact on food security", the vast majority of respondents indicated that they were familiar with the concept and were of the opinion that this factor has an impact on food security. Research among Turkish consumers shows that moral attitudes are an important factor for food wastage behavior. Moral attitudes have a strong influence not only on food wasting behavior, but also on eating and shopping behavior [1]. Comparative studies conducted in the United Kingdom,

Spain and Italy among the population aged between 18 and 35 indicate that home food management and grocery shopping behavior have an impact on reducing the frequency of food waste in all three countries studied [5]. Studies among young consumers indicate that they are keen to source food from supermarkets and yet the main reason for generating food waste is the expiry date [11]. The analysis of our own research on the impact of food losses and waste on selected aspects related to food security (Table 5) shows that young consumers do not see a link between food security and shortage of available food and loss of income for farmers, producers and processors (the response to the research does not combine these functions with baseline, age and place of residence ($p > 0.05$) despite previously declared knowledge and understanding of food losses and waste. Moreover, they do not perceive security as an aspect of economic losses incurred by consumers, but notice its consequences in the form of higher food prices on shop shelves. The majority of respondents with secondary education observe a link between food security and the waste of scarce natural resources - soil, water, energy used in the process of food production. The problem is more often perceived by urban (63.6 %) than rural (53.6 %) residents and the results are significantly statistically significant ($p < 0.05$). Undoubtedly, meeting the food needs of a growing population sustainably on the basis of limited resources, while protecting the environment, is one of humanity's greatest challenges in the coming decades. Current trends in populations and consumption preferences will continue to increase the demand for food [2]. Projected global population growth will significantly increase pressure on natural resources to meet food needs. In order to achieve food security for all, in the context of finite resources and a changing climate, without further compromising the quality of ecosystems and biodiversity, a multidimensional and integrated global strategy is required, which is reflected in the Agenda 2030 goals [2, 6, 19].

The subject of this study was also to indicate the characteristics of food products or packaging that build trust in terms of safety. The most frequently indicated answers among the respondents with primary and secondary education were quality, nutritional value and contents, as well as price and the external appearance of the packaging. The respondents characterized by higher education paid more attention to contents as for the other two groups of respondents (Table 6). Interestingly, given the place of residence, urban residents were more interested in the contents of the product (68.4 %) and less interested in the nutritional value of the product (55.8 %) than rural residents (68.4 and 55.8 %). The self-reported results may confirm an increased awareness among young consumers of the importance of the composition of food products on health and well-being. On the other hand, research conducted by Kowalska [14] on the population of Wrocław indicates that the most important factors highlighted by the survey respondents ($n=147$) were the lack of preservatives, implementation of HACCP or ISO

Table 5. The impact of food losses and waste on selected food-related aspects in the opinions of young adults (single choice question).
 Tabela 5. Wpływ strat i marnowania żywności na wybrane aspekty związane z żywnościowym w opiniach młodych dorosłych (pytanie jednokrotnego wyboru).

	Education [%] / Wykształcenie [%]				Age in years [%] / Wiek w latach [%]			Place of residence [%] / Miejsce zamieszkania [%]		
	Primary school / Podstawowe	Secondary school / Średnie	Higher education / Wyższe	<i>p</i> *	15÷19	20÷29	<i>p</i>	Countryside / Wieś	City / Miasto	<i>p</i>
Shortage of available food / Brak dostępnej żywności										
Yes / Tak	32.8	23.2	21.9	0.03	31.6	21.6	<0.01	26.5	25.1	0.77
No / Nie	67.2	76.7	78.1		68.4	78.4		73.5	74.9	
Loss of income for farmers, producers, processors / Utrata dochodu przez rolników, producentów, przetwórców										
Yes / Tak	33.8	26.7	32.0	0.20	32.4	28.2	0.41	31.3	27.9	0.42
No / Nie	66.2	73.2	68.0		67.6	71.8		68.7	72.1	
Economic losses incurred by consumers / Straty ekonomiczne poniesione przez konsumentów										
Yes / Tak	39.4	36.3	29.7	0.20	38.2	34.2	0.31	36.9	34.4	0.58
No / Nie	60.6	63.7	70.3		61.8	65.8		63.1	65.56	
Higher food prices / Wyższe ceny żywności										
Yes / Tak	35.4	35.4	29.7	0.48	37.4	31.8	0.17	36.1	31.2	0.23
No / Nie	64.6	64.6	70.3		62.6	68.2		63.9	68.8	
Difficulties with access to food / Trudności z dostępem do żywności										
Yes / Tak	32.3	29.6	22.6	0.16	33.1	26.0	0.07	28.5	30.0	0.76
No / Nie	67.7	70.4	77.4		66.9	74.0		71.5	70.0	
Population living in poverty / Liczba ludności żyjącej w ubóstwie										
Yes / Tak	25.8	26.1	18.0	0.16	26.2	23.0	0.36	26.0	21.9	0.28
No / Nie	74.2	73.9	82.0		73.8	77.0		74.0	78.1	
Waste of scarce natural resources - soil, water, energy used for food production / Marnowanie ograniczonych zasobów naturalnych – gleby, wody, energii wykorzystywanych do produkcji żywności										
Yes / Tak	43.4	58.6		<0.01	43.3	64.9	0.00	50.6	63.6	0.00
No / Nie	56.6	41.4	32.8		56.7	35.01		49.4	36.4	

*Chi²

principles and a well-known brand. The results obtained are worrying for the author of the publication, especially because of the low awareness of valuable information provided through food labels.

Table 6. Product or packaging features that build trust in terms of health safety by education level, age and place of residence.

Tabela 6. Cechy produktu lub opakowania powodujące zaufanie pod względem bezpieczeństwa zdrowotnego według wykształcenia, wieku i miejsca zamieszkania.

	Education [%] / Wykształcenie [%]				Age in years [%] / Wiek w latach [%]			Place of residence [%] / Miejsce zamieszkania [%]		
	Primary school / Podstawowe	Secondary school / Średnie	Higher education / Wyższe	<i>p</i> *	15÷19	20÷29	<i>p</i>	Countryside / Wieś	City / Miasto	<i>p</i>
Brand / Marka	34.3	29.3	26.6	0.28	34.6	27.1	0.03	28.0	34.0	0.12
Country of production / Kraj produkcji	35.9	35.4	35.2	0.98	35.6	35.3	0.98	34.8	36.4	0.75
Country of origin / Kraj pochodzenia	41.4	38.9	31.3	0.16	39.6	37.0	0.47	39.2	36.4	0.54
Price / Cena	33.8	18.8	19.5	<0.01	32.0	17.3	0.00	24.9	21.5	0.36
Contents / Skład surowcowy	48.5	71.3	75.8	<0.01	51.6	75.3	0.00	63.1	68.4	0.19
Nutritional value / Wartość odżywcza	48.5	60.8	55.5	0.02	51.3	59.5	0.06	56.0	55.8	0.95
Packaging / Opakowanie	28.3	20.4	14.8	0.01	27.3	17.5	0.00	20.9	23.1	0.57
Appearance / Wygląd	32.3	24.8	25.8	0.17	30.9	24.6	0.10	27.7	26.7	0.85
Quality / Jakość	53.5	60.5	56.3	0.3	55.6	58.9	0.53	57.0	58.3	0.81
Organoleptic qualities / Walory organoleptyczne	32.3	40.1	40.6	0.15	34.20	40.6	0.11	38.2	37.30	0.88

*Chi²

It was also of interest to the research team to determine the way in which young consumers reduce the risk of purchasing and consuming unsafe food when making their choices on shop shelves. The most frequently indicated predictor by the respondents in all education groups was checking the expiry date (32.8 % of rural residents and 66.0 % of urban residents). It was statistically significant ($p < 0.05$) that the respondents indicated reading food labels especially among urban residents (73.3 %). The results obtained correlate with the above-discussed characteristics of the food product

Table 7. How to reduce the risk of buying and consuming unsafe food -distribution of answers by education, age and place of residence of respondents

Tabela 7. Sposób ograniczenia ryzyka zakupu i spożycia niebezpiecznej żywności -rozkład odpowiedzi według wykształcenia, wieku i miejsca zamieszkania ankietowanych

	Education [%] / Wykształcenie [%]				Age in years [%] / Wiek w latach [%]			Place of residence [%] / Miejsce zamieszkania [%]		
	Primary school / Podstawowe	Secondary school / Średnie	Higher education / Wyższe	<i>p</i> *	15÷19	20÷29	<i>p</i>	Countryside / Wieś	City / Miasto	<i>p</i>
Reading labels / Czytanie etykiet	53.5	73.9	75.8	<0.01	56.7	76.4	<0.01	64.6	73.3	0.03
Checking the expiry date / Sprawdzanie przydatności terminu do spożycia	61.6	66.9	60.9	0.34	61.8	65.7	0.38	62.8	66.0	0.47
Following information and warnings published by the Chief Sanitary Inspector/ Śledzenie informacji i ostrzeżeń publikowanych przez GIS	42.4	52.5	55.5	0.03	42.2	55.9	<0.01	46.1	56.3	0.01
Following information and warnings published in the media / Śledzenie informacji i ostrzeżeń publikowanych w mediach	28.3	26.4	24.2	0.7	28.00	25.5	0.49	26.7	26.3	0.98
Buying food from specific stores/places / Kupowanie żywności w określonych sklepach/miejscach	29.3	27.1	28.1	0.86	29.5	26.9	0.70	27.0	29.6	0.54
Planning purchases / Planowanie zakupów	22.7	33.8	36.7	0.01	24.4	35.9	0.00	27.7	36.0	0.03
Skillful and rational management of food supplies at home / Umiejętne i racjonalne zarządzanie zapasami żywności w domu	31.3	44.0	47.7	<0.01	32.7	46.9	0.00	39.2	43.3	0.34

*Chi²

causing increased confidence in terms of safety and indicate high awareness among the survey participants of the risk reduction associated with the consumption of dangerous food.

Similar observations were made by Kumar and Kapoor [16] when studying Indian young consumers. The results showed that they paid a lot of attention to food labels and read them before making a final purchase decision. Apart from the price, the young consumers considered all the product attributes that affected the health of the consumers to be extremely important. Information on various important product attributes can be broadly divided into two categories, namely 'product specification' and 'product quality'. The final decision to purchase a product on the basis of food labels varied greatly depending on the gender, age, eating habits and location of consumers [16].

Table 8. Type of information checked on packaging while shopping -distribution of answers by education, age and place of residence of respondents (multiple choice question).

Tabela 8. Rodzaj informacji sprawdzanych na opakowaniach podczas zakupów rozkład odpowiedzi według wykształcenia, wieku i miejsca zamieszkania ankietowanych (pytanie wielokrotnego wyboru).

	Education [%] / Wykształcenie [%]				Age in years [%] / Wiek w latach [%]			Place of residence [%] / Miejsce zamieszkania [%]		
	Primary school / Podstawowe	Secondary school / Średnie	Higher education / Wyższe	<i>p</i> *	15÷19	20÷29	<i>p</i>	Countryside / Wieś	City / Miasto	<i>p</i>
I do not check any information / Nie sprawdzam żadnych informacji	15.2	5.1	15.2	<0.01	14.6	3.01	<0.01	9.2	6.1	0.21
Expiry date / Termin ważności	66.7	80.9	66.7	<0.01	68.4	84.7	<0.01	74.3	83.0	0.10
Nutritional value / Wartość odżywcza	35.9	46.5	35.9	0.05	38.9	45.8	0.58	41.7	44.5	0.54
Energy content / Zawartość energii	30.3	26.4	30.3	0.06	29.5	23.6	0.14	28.0	23.1	0.20
Contents / Skład surowcowy	27.3	48.4	27.3	<0.01	31.6	52.6	<0.01	39.2	50.6	0.01
Sugar content / Zawartość cukru	26.7	36.6	26.8	<0.01	29.1	42.5	0.05	33.6	41.7	0.05
Saturated fat content / Zawartość tłuszczów nasyconych	17.2	17.5	17.2	0.93	18.6	17.0	0.6	17.1	18.6	0.69

Content of trans fats / Zawartość tłuszczów trans	11.1	14.3	11.1	0.05	12.7	16.2	0.29	14.5	14.9	0.95
Content of additives (colors, preservatives, flavor enhancers, etc.) / Zawartość substancji dodatkowych (barwniki, konserwanty, wzmacniacze smaku itp.)	21.2	24.8	21.7	0.04	22.9	27.9	0.2	22.4	31.2	0.02
Country of production / Kraj produkcji	13.1	17.2	13.1	0.21	14.5	18.1	0.42	16.0	17.4	0.73
Country of origin of contents/ Kraj pochodzenia surowców	14.1	10.1	14.1	0.26	13.5	11.5	0.50	13.0	11.3	0.62
Net weight / Masę netto	20.2	19.4	20.2	0.96	21.1	18.9	0.69	18.1	22.7	0.19
Method of preparation for consumption / Sposób przygotowania do spożycia	13.6	14.0	13.6	0.97	14.9	12.9	0.41	13.0	15.0	0.55
Certification symbols / Symbole certyfikatów	14.6	10.2	14.6	0.30	14.6	10.4	0.13	10.7	14.6	0.18
Information on special characteristics of the products e.g., health claims / Informacje o specjalnych cechach produktów np., oświadczenia zdrowotne	12.2	6.7	12.1	0.05	11.3	5.8	0.02	7.9	8.5	0.89
Type of sweetener / Rodzaj środka słodzącego	13.6	22.0	13.6	0.00	13.8	27.1	0.00	16.5	29.1	<0.01

*Chi²

This work also presents the aspects of reducing food waste, which is a serious global problem. [3,8]. Checking the expiry date is one of the factors that can reduce the progressive problem in highly developed countries. Studies show that young consumers are more likely to waste food than older people, at the same time as the observed 'zero waste' trend. The most common factor causing food waste is exceeding the expiry date [21]. Our own results show that the type of information most frequently checked by young consumers is precisely the 'best-before' date, both among consumers with primary (66.7 %), secondary (80.9 %) and tertiary education (66.7 %). Another positive result of the research is that consumers check the contents (56.0 % of rural resi-

dents and 39.2 % of urban residents, respectively), as well as additives and the addition of sweeteners.

Conclusions

1. As a result of the research, it can be concluded that young consumers have nutritional knowledge and pay attention to food labels.
2. The study can inspire and contribute to further research in the field of food waste.
3. The study can help develop an educational campaign to reduce food waste and ensure proper food management especially among young consumers.
4. Consideration should be given to educating students about safety, the quality of the food they choose and the reduction of food waste and its consequences.
5. The research could be extended in the future to include other aspects related to food labelling literacy, e.g. related to the ability to correctly read the expiry date.

Limitations

This study also has limitations. The surveyed group of respondents was not representative and took into account the excess number of women, which may result in the inability to draw proper conclusions about the entire population.

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STAN WIEDZY NA TEMAT BEZPIECZEŃSTWA I MARNOWANIA ŻYWNOŚCI WŚRÓD MŁODYCH KONSUMENTÓW- CZĘŚĆ 2

Streszczenie

Wprowadzenie. Żywnienie należy do jednego z ważniejszych czynników stylu życia mogących mieć wpływ na stan zdrowia i rozwój chorób. Zachowania żywieniowe uwzględniające prawidłowe nawyki higieniczne mogą stanowić skuteczną metodę zapobiegania większości chorób przenoszonych przez żywność. Wraz z dynamicznym rozwojem światowych rynków żywności oraz zwiększoną dostępnością do żywności szczególnie w krajach wysokorozwiniętych obserwuje się postępujące zjawisko związane z nieracjonalnym gospodarowaniem żywnością na wszystkich etapach łańcucha żywnościowego. Mają one swoje konsekwencje zarówno środowiskowe, ekonomiczne, etyczne i społeczne. Celem pracy było określenie poziomu wiedzy na temat bezpieczeństwa żywności oraz strat i marnowania żywności wśród młodych dorosłych

Wyniki i wnioski. Wśród ankietowanych, dominowali młodzi konsumenci w wieku 15 ÷ 26 lat zamieszkujący tereny głównie tereny wiejskie. Przedmiotem zainteresowania zespołu badawczego było określenie stanu wiedzy na temat bezpieczeństwa żywnościowego i żywności, wpływ strat i marnowania żywności na bezpieczeństwo żywnościowe oraz sposób ograniczenia ryzyka zakupu i spożycia niebezpiecznej żywności. Ponadto określono jaki rodzaj informacji sprawdzany jest na opakowaniach podczas zakupów. Wykazano, że młodzi konsumenci posiadają wiedzę żywieniową i zwracają uwagę na etykiety produktów spożywczych. Należy rozważyć edukację uczniów na temat bezpieczeństwa, jakości wybieranej żywności oraz ograniczenia marnowania żywności i jego konsekwencji.

Słowa kluczowe: bezpieczeństwo żywności, edukacja, młodzi konsumenci, marnowanie żywności, etykiety produktów spożywczych 