

GENDER AS A FACTOR INFLUENCING THE FREQUENCY OF MEAT AND FISH CONSUMPTION IN YOUNG ADULTS

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ABSTRACT

Background. Meat and fish contain easily digestible whole protein, B vitamins and numerous minerals, such as zinc, phosphorus and iron, thanks to which these products have a high nutritional value.

Objective. The aim of the study was to assess the frequency of consumption of meat and fish in young adults depending on gender.

Material and Methods. Data was collected from 200 respondents aged 19-30 using online survey questionnaire. The questionnaire was divided into three parts. The first part contained questions about sociodemographic and anthropometric data, the second part contained a question regarding the self-assessment of the diet. Whereas, the third part of the questionnaire concerned the frequency of consumption of meat and fish. Statistical analysis of the results was performed using Statistica 13.3 software and statistical significance was assumed at the $p \leq 0.05$ level.

Results. Meat consumption was declared by 86.5% of the respondents (83% of women and 90% of men), usually 5-6 times a week (20%). Gender statistically significantly differentiated the frequency of meat consumption. Men significantly more often consumed total meat ($p=0.002$), red meat ($p=0.001$) and poultry ($p=0.004$) compared to women. Fish was eaten by 85% of the respondents, and 39% only 1-3 times a month. Respondents preferred oily fish. There were no statistically significant differences in the consumption of fish by men and women.

Conclusions. Considering the complexity of the relationship between men and women's meat and fish consumption and health, research is needed to clarify the amounts of meat and fish consumed, the degrees and how they are processed, and the reasons for eating or not eating them. This can be helpful in directions for nutritional education.

Key words: young adults, meat, fish, frequency of meat consumption, frequency of fish consumption, men, women

INTRODUCTION

In Poland in 2019, 41% of deaths were caused by cardiovascular diseases. The second leading cause of death in Poland was malignant neoplasms, which accounted for one-fifth of all deaths [40]. Diet and lifestyle have a big impact on human health and life expectancy. Both in the case of cardiovascular diseases and malignant neoplasms, it is possible to apply preventive measures to reduce the risk of their occurrence. Such activities include the consumption of food products low in cholesterol and saturated fats, and rich in health-promoting polyunsaturated fatty acids and antioxidants. Products such as meat and fish, like any animal product, contain cholesterol, but their nutritional value varies greatly. Existing differences concern not only the content of fat in consumed products, but also the profile of fatty acids [26].

The impact of meat consumption on health is particularly important for Poles, due to how important this product is in the Polish food ration, where the average diet is dominated by meat products, especially red meat and poultry [17]. On the one hand, these products can be a source of complete protein, easier to digest than vegetable protein. By providing important macro- and microelements, such as bioavailable heme iron, zinc, B vitamins and vitamin A, meat is considered a valuable and nutritious product. On the other hand, however, the relationship between the consumption of meat (especially processed and red meat) and many civilization diseases is emphasized. The negative impact of meat consumption on human health includes diseases such as type 2 diabetes, certain types of cancer (e.g. esophagus, stomach), cardiovascular diseases and increased mortality risk [28].

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Publisher: National Institute of Public Health NIH - National Research Institute

The subject of the impact of meat consumption on health is focused mainly on red meat. However, there are also studies showing a different effect of white meat, i.e. poultry, and red meat on the risk of certain diseases. In a study of nearly 500,000 adults, a higher consumption of both red and white meat was associated with a higher risk of diverticular disease and type 2 diabetes, but also a lower risk of iron deficiency anemia. However, high consumption of red meat alone was associated with a higher risk of coronary heart disease, pneumonia and colon polyps. Conversely, a higher risk of gastroesophageal reflux disease, gastroduodenitis, and gallbladder disease was observed with high consumption of only poultry meat [24]. It has been shown that excessive consumption of red meat may contribute to an increased risk of certain malignancies, adversely affect the functioning of the circulatory system, or disturb the lipid profile in the blood. Consumption of red meat in the amount of even 100 g per day increases the risk of stroke, malignant tumors of the breast, colon and prostate, and increases the risk of death from cardiovascular causes by as much as 15% [41]. High red meat consumption was also associated with non-alcoholic fatty liver disease and insulin resistance [43]. Another study also showed a significant link between higher consumption of red meat and cancer, especially colon, lung, esophageal and stomach cancers [18]. *Ibsen et al.* (2019) noted that replacing red meat intake with fish or poultry meat was associated with a lower risk of type 2 diabetes [10].

As part of the research, it has also been shown that the high nutritional value of meat can positively affect mental health. Conducted by *Dobersek et al.* (2021), a systematic review found that in eleven of the eighteen studies reviewed, not eating meat was associated with poorer mental health. Some studies have shown that the risk of depression, anxiety and/or self-injury was significantly higher in those who avoided meat [6]. Meat products can also be an important element in the nutrition of athletes due to the high content of: taurine, L-carnitine, coenzyme Q10, choline, alpha-lipoic acid, conjugated linoleic acid, glutathione, creatine, minerals such as iron and zinc and bioactive peptides. These ingredients may have the effect of protecting cell membranes from oxidative stress and controlling inflammation. Thus, meat consumption may help reduce signs of muscle damage and accelerate recovery from exercise [5].

Fish, on the other hand, are characterized by high nutritional value in terms of beneficial amounts of highly assimilable protein with a balanced amino acid composition, valuable lipids and essential biocomponents, such as vitamins and minerals [26]. Therefore, the consumption of fish, which has a lower caloric density and a higher content of omega-3

polyunsaturated fatty acids compared to land animals, is strongly associated with numerous positive health effects [37]. Fish is a food rich in components such as omega-3 acids: EPA and DHA, which are known for their health-promoting properties. They have a blood pressure lowering effect and also support the development of the nervous system in children [2]. *Kim et al.* [12] showed a positive effect on human health when consuming two to four servings of fish per week. This frequency of consumption resulted in a 12% reduction in cardiovascular disease mortality and a 21% reduction in coronary heart disease mortality (CHD). The frequency of fish consumption 2-4 times a week not only reduced the risk of death due to these diseases, but even their occurrence. This study also showed a beneficial effect of fish consumption in the prevention of cancer, metabolic syndrome, dementia, the onset of Alzheimer's disease, musculoskeletal and gastrointestinal problems. In turn, *Wang et al.* (2022) confirmed the positive impact of the consumption of marine fish and omega-3 fatty acids contained in them on higher survival among people with cancer [38]. Among the studies, there are also those indicate that with increased consumption of fish, the risk of metabolic diseases was reduced [12, 38] and bone mineral density was increased [19, 29].

In addition to the many positive effects of fish consumption on human health, there are also potential risks associated with the consumption of these products. These threats may result from human errors committed e.g. during thermal processing or due to environmental pollution, in particular water. Raw or undercooked fish can be carriers of tapeworms or their larvae, which, after getting into the human body, deplete it of vitamin B₁₂, and as a result can lead to anemia. Other potential risks associated with fish consumption include tetrodotoxin poisoning (a powerful neurotoxin found in fish), marine poisoning, bacterial poisoning from eating spoiled meat, and heavy metal poisoning such as mercury [22]. It is the heavy metals present in certain types of fish are often the reason why consumers choose not to buy fish for fear that it is contaminated [9]. Although heavy metals are indeed present in fish, in particular in predatory, large and older fish, there is a lot of evidence the values of these pollutants in most cases do not exceed the established standards [3, 16, 25].

MATERIAL AND METHODS

Sample and data collection

The study was conducted in the period from June 2021 to October 2022 using the online interview technique (CAWI) with the use of a questionnaire. The questionnaire was made available to the respondents using an Internet tool – Google Form. The study group

was selected using non-probability sampling methods. They were: purposeful selection (selected groups for young adults in social media), convenience selection (respondents among family and friends) and snowball selection (respondents shared the questionnaire with others). 206 people expressed their willingness to participate in the study, of which 200 respondents (100 women and 100 men) constituted the final research sample. Three people were excluded from the study because they did not meet the age criterion of 19-30 years, while the answers of the remaining 3 people regarding anthropometric questions were unreliable and were not included in the study. Figure 1 shows the sample selection scheme, taking into account the inclusion criteria and the reasons for exclusion.

The questionnaire was divided into three parts. The first part contained questions about sociodemographic and anthropometric characteristics. This part includes open questions about: age (years), height (m), body weight (kg) and closed questions about gender (female, male), education (primary, vocational, secondary or higher), place of residence (village, city < 100,000 inhabitants or city over 100,000 inhabitants), number of household members (<2, 3-4 or >5), professional status (I do not work, I work, I study/study and at the same time I work, I study I am studying and not working). In the first part of the survey, respondents were also asked about smoking (yes or no), self-rated

physical activity (no/low, medium or high), self-rated health (very good, good, average, poor/very poor or I don't know) and self-rated economic situation (very good, good, average, poor/very poor or I don't know).

The second part of the questionnaire contained a question regarding the self-assessment of the diet (very good, good, average, poor/very poor or I don't know).

The third part of the questionnaire concerned the frequency of consumption of meat and fish. In the opening instructions of this section of the questionnaire, the respondents were informed how to indicate the answers. Respondents were asked to indicate the frequency of consumption of: red meat (beef, pork, veal, lamb and mutton), poultry meat (chicken, turkey, duck and goose meat), fatty fish (salmon, herring, mackerel, tuna, halibut, eel, sprat, sardines and sea trout) and lean fish (cod, pike, zander, hake and perch). Consumption of these products was to include all meals and snacks as well as meals eaten at home and away. It was possible to choose only one answer that best describes the diet of the examined person in the last 6 months. Consumption frequency questions were closed and the response cafeteria included choices such as: never, <1/month, 1-3/month, 1/week, 2/week, 3-4/week, 5-6/week, 1/day or 2 and more/day.

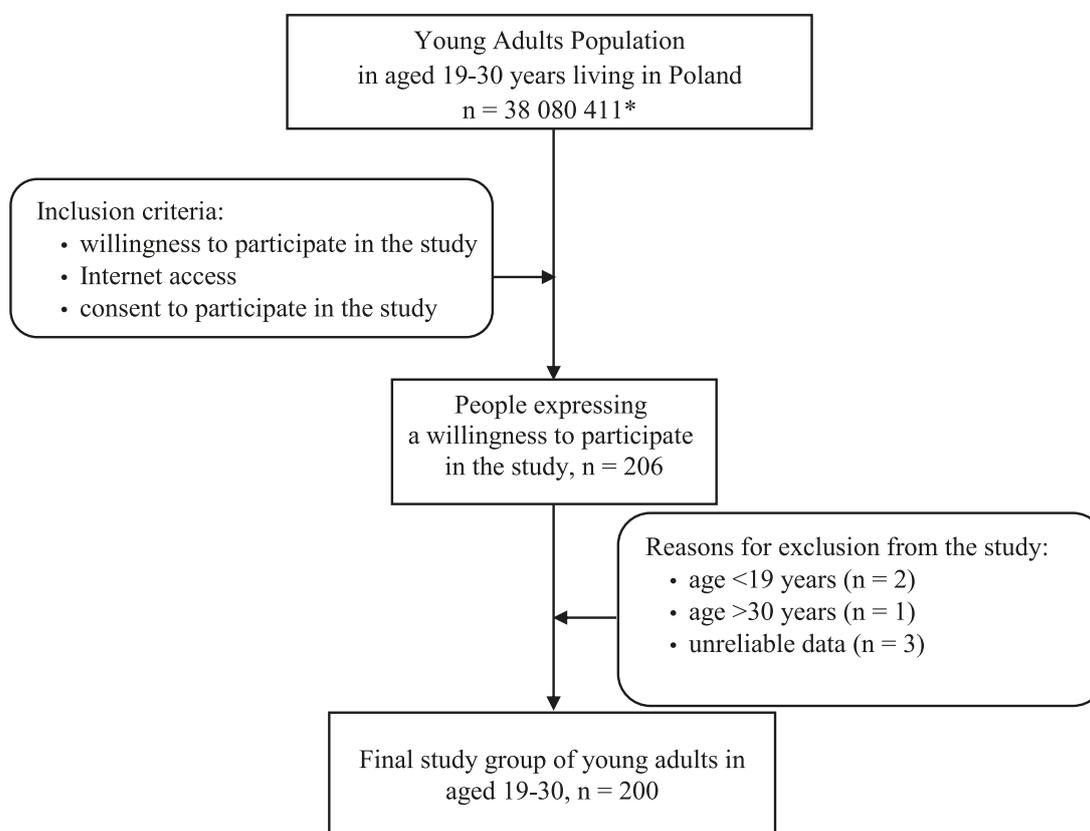


Figure 1. Scheme of selection of the research

*[32]

Statistical analyses

The obtained answers were transferred to Microsoft Excel in order to check them, assign numbers to the respondents and calculate the Body Mass Index (BMI). Obtaining information about the height and weight of the subjects made it possible to divide the research group. The respondents were divided into subgroups based on the classification of the World Health Organization (Tab. 1) [42] by calculating the body mass index (BMI) of each respondent according to the formula:

$$\text{BMI} = \frac{\text{body weight [kg]}}{\text{height}^2 \text{ [m}^2\text{]}}$$

Table 1. Categories of nutritional status based on body mass index [42]

Classification	BMI (kg/m ²)
Underweight	< 18.5
Normal body weight	18.5 – 24.9
Overweight	25.0 – 29.9
Obesity	≥ 30.0

The obtained results were statistically analyzed in the Statistica 13.3 program. The *Chi² Person* test was used to determine statistical relationships. It was used to determine the effect of gender on the frequency of consumption of various types of meat and fish by young adults. Differences calculated with the Pearson *Chi²* test were considered statistically significant at $p \leq 0.05$.

RESULTS

The surveyed group of young adults consisted of 200 respondents aged 19 to 30 (Tab. 2), with the average age of the respondents slightly above 23 years. The average BMI value in the study group was 23.01

(kg/m²) and meant normal body weight. Three-fourths of the subjects were of normal weight, i.e. BMI ranged from 18.5 to 24.9 kg/m². Among the respondents, about half were people with higher education and more than half were people who lived in large cities and every second respondent indicated 3-4 people living in his household. The largest percentage of respondents indicated they currently work, do not smoke, and mostly assessed their physical activity as moderate and health, diet and financial situation as good (Table 2). None of the respondents declared poor/very poor their status health.

In the own study, it was found meat in general (i.e. red and poultry) was eaten relatively often, every fifth respondent asked about the frequency of meat consumption declared meat consumption 5-6 times a week and this was the most frequently chosen answer (20% of respondents in total).

The largest percentage of men and women declared meat consumption 5-6 times, but with a predominance of men (Figure 2). Men, on the other hand, significantly outnumbered women when it comes to daily meat consumption. Every third surveyed man admitted that he eats meat at least once a day. Such frequency was declared by only 12% of the respondents. It can therefore be seen sex was a statistically significant differentiating factor in terms of the frequency of total meat consumption ($p=0.002$). Lack of consumption or a very low frequency of consumption of this product (1-3 times a month) was typical for women, while daily consumption concerned mainly men.

Red meat, including beef, pork, veal, lamb and mutton, was not eaten very often by respondents. Every fifth young adult did not eat it at all. A slightly smaller number of people eating this type of meat declared the frequency of consumption at the level of 1-3 times a month (19% of respondents in total). On the other hand, every third respondent (31%) ate red meat two to four times a week.

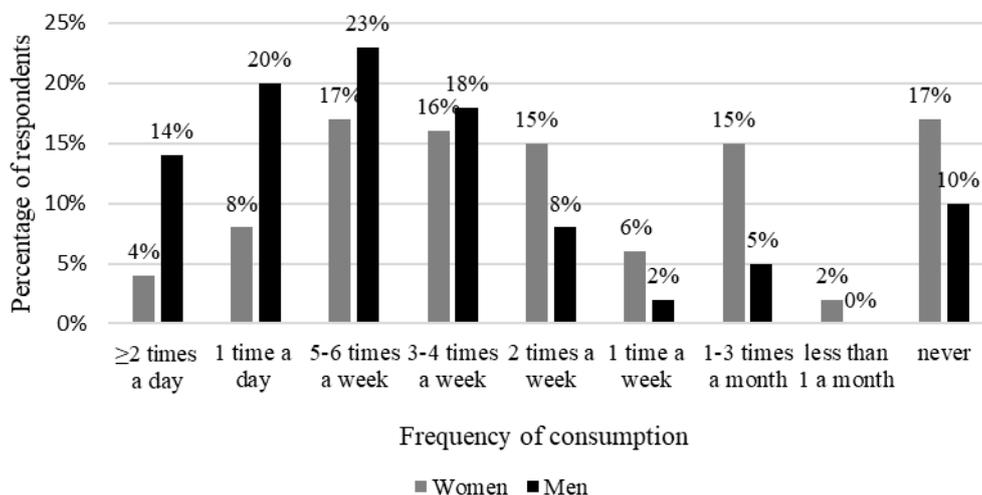


Figure 2. Frequency of total meat consumption in the study group of young adults

Table 2. Characteristics of the studied population

Variables	Group	Total (%)	Women (%)	Men (%)
Gender	Women	50	100	0
	Men	50	0	100
BMI	Underweight	5.5	9	2
	Normal body weight	70	75	65
	Overweight	20	11	29
	Obesity	4.5	5	4
Education	Primary	0	0	0
	Professional	4.5	3	6
	Secondary	50.5	50	51
	Higher	45	47	43
Place of residence	Village	19	24	14
	Town	20.5	14	27
	City	60.5	62	59
Number of people in the household	< 2	34.5	41	28
	3-4	51	44	58
	> 5	14.5	15	14
Professional status	I do not work	0	0	0
	I work	38.5	33	44
	I study/study and work	30	27	33
	I study	31.5	40	23
Smoking cigarettes	Yes	17	13	22
	No	83	87	78
Self-assessment of health	Very good	30.5	26	35
	Good	56.5	63	50
	Average	9	8	10
	I do not know	4	3	5
Self-assessment of physical activity	No/low	27	36	18
	Moderate	47	49	45
	High	26	15	37
Self- assessment of nutrition	Very good	8.5	13	4
	Good	44	50	38
	Average	36.5	34	39
	Poor/Very poor	10	3	17
	I do not know	1	0	2
Self-assessment of economic situation	Very good	17	24	10
	Good	49.5	51	48
	Average	32.5	23	42
	Poor/Very poor	1	2	0
	I do not know	0	0	0

There were statistically significant differences in the frequency of red meat consumption depending on the gender of the respondents ($p=0.001$). Every fourth woman did not eat red meat at all (Figure 3). In the case of men, one in four of them ate such meat twice a week. It was also observed that twice as many men than women declared consumption of red meat with a frequency of 3-4 times a week (Figure 3).

Poultry meat in the study included chicken meat, turkey meat, duck meat and goose meat and was more often consumed than red meat. Compared to a fifth of respondents not consuming red meat, 16% of respondents did not eat poultry. There were also relatively few people characterized by sporadic consumption of this meat (up to several times a month) – 13%, which is more than twice less than in the case

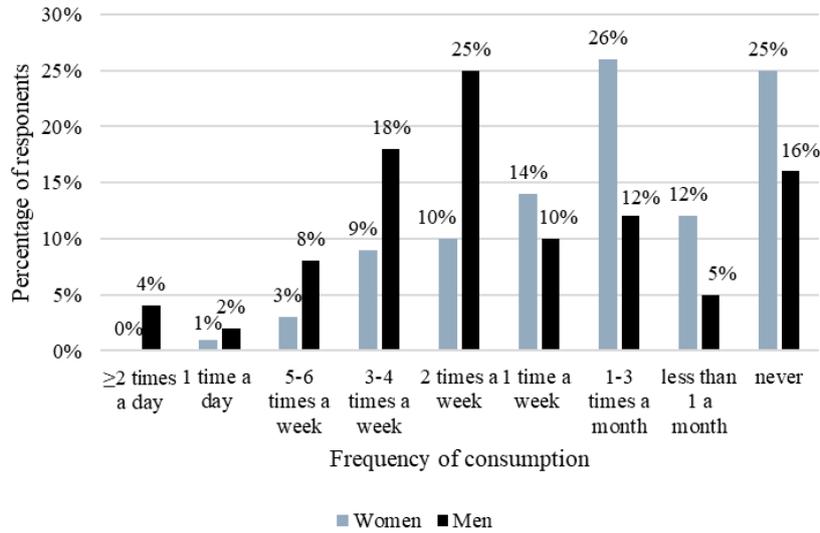


Figure 3. The frequency of red meat consumption in the study group of young adults

of red meat. This may be due to the fact of consciously reducing the consumption of red meat and replacing it with white meat. As many as one third of respondents declared poultry consumption at the level of 3-4 times a week. It can therefore be concluded that poultry meat was more common in the diet of the respondents.

The frequency of poultry meat consumption differed statistically significantly depending on the sex of the respondents ($p=0.004$). Men were more likely to consume this type of meat (Figure 4). Two-thirds of them ate poultry several times a week, of which the majority (40% of surveyed men) declared consumption 3-4 times a week. Such frequency of consumption was also most often declared by women, but it was only a quarter of the respondents who declared the consumption of this type of meat (Figure 4).

The group of fatty fish includes salmon, herring, mackerel, tuna, halibut, eel, sprat, sardines and sea trout. Cod, pike, zander, hake and perch were given as examples of lean fish species. The frequency of fish consumption (including fatty and lean fish) was very low. The largest percentage of respondents, about 40%

(all respondents) declared the consumption of fish 1-3 times a month.

Gender was not a statistically significant differentiating factor in the case of the overall frequency of fish consumption by the surveyed young adults (Figure 5). Both the majority of women and men indicated the consumption of fish from one to three times a month (36% and 42%, respectively). Among those who consume fish, the second most frequently declared frequency of consumption was once a week. A similar percentage of men and women declared fish consumption in accordance with the recommendations, i.e. twice a week (Figure 5).

Also, gender was not a statistically significant factor differentiating the frequency of consumption of fatty fish (Figure 6). The greatest difference in consumption between the sexes was observed with the consumption in accordance with the recommendations – twice a week. 12% of women and only 2% of men declared such a frequency. Men, however, were more likely than women to report higher intakes, three to six times a week. Assuming that the sufficient frequency of

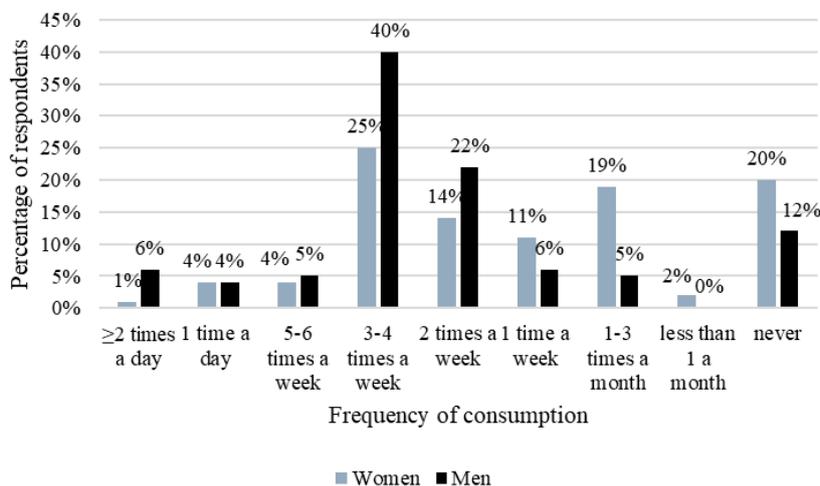


Figure 4. Frequency of poultry consumption in the study group of young adults

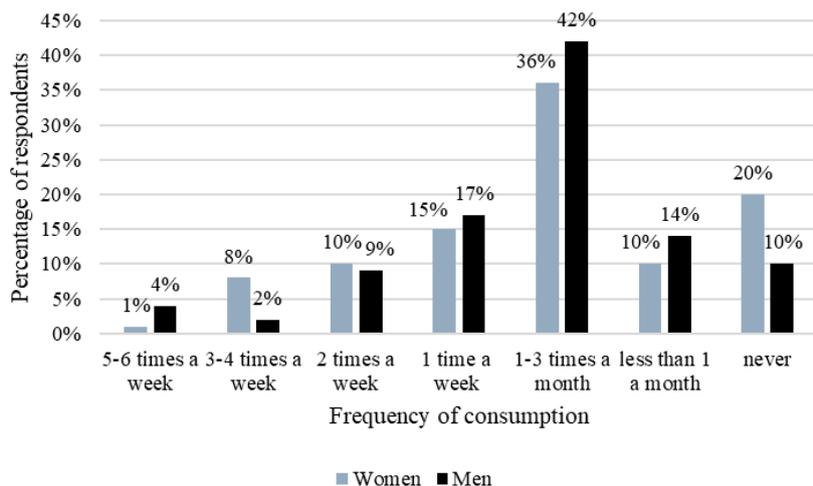


Figure 5. Frequency of total fish consumption in the study group of young adults

consumption of fatty fish is at least once a week, such consumption would be declared by a similar number of respondents of both sexes (28% of men and 30% of women) – Figure 6.

As in the case of total fish and oily fish, sex did not turn out to be a statistically significant factor

differentiating the frequency of consumption of lean fish (Figure 7). Consumption of this type of fish was declared by only slightly more than two-thirds of women and almost three-quarters of men. However, both sexes were characterized by a low frequency of consumption of these products – 63% of men and

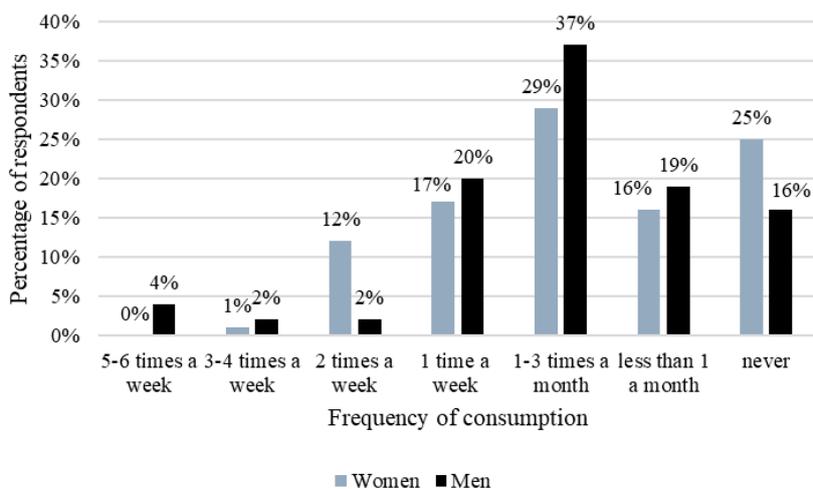


Figure 6. Frequency of fatty fish consumption in the study group of young adults

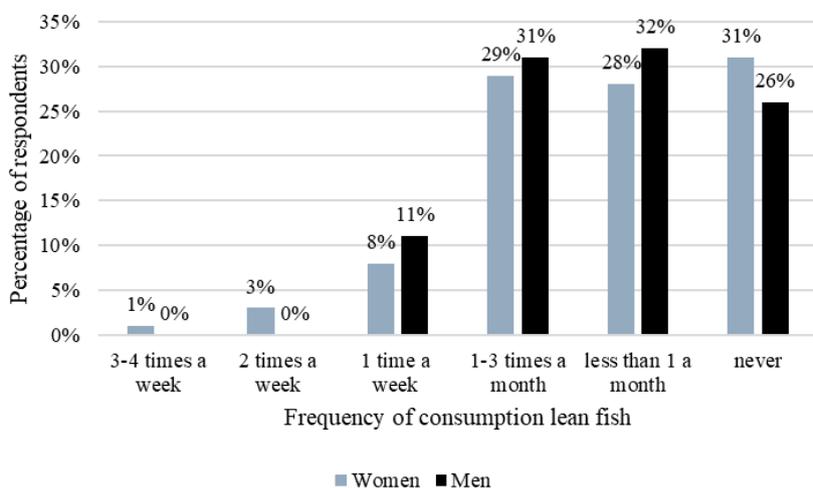


Figure 7. Frequency of lean fish consumption in the study group of young adults

57% of women declared the consumption of lean fish at a level not exceeding 3 times a month. Higher consumption, i.e. at least once a week, was very similar for both sexes, as 12% of women and 11% of men declared such frequency of consumption of lean fish (Figure 7).

DISCUSSION

Currently, it can be seen that vegetarian and vegan diets are becoming more and more popular in Poland, especially among young adults. People who give up meat in their diet are guided by various motives, including: religious, ethical or environmental reasons. The authors of studies on the frequency of meat consumption in most cases do not agree with each other. The results of studies conducted in Poland differ. These differences occur both in the percentage of respondents who do not consume meat and in individual categories of the frequency of its consumption. Researchers often also chose another differentiating factor, such as the age of the respondents, and not gender, as in the case of their own study.

In our own study, 13.5% of the respondents (17% of women and 10% of men) did not eat meat similarly to the *Olszak* study [23], in which 11.5% of young adults declared not eating meat. A similar number of people who did not eat meat (11%) was also found among students of Warsaw universities in the *Kucharska* et al. study [14]. A slightly lower percentage concerned all respondents who took part in the *Kowalcze* et al. study [13] it was 8% of the surveyed students of dietetics. In the *Malczyk* et al. study [21] among the surveyed adults, respondents who did not eat meat accounted for only 6.7% of all respondents. A similar percentage was obtained by *Adamski* et al. study [1], in which only 6% of respondents declared not eating meat.

In our own study, the respondents most often declared daily consumption of meat (23%) and with a frequency of 5-6 times a week (20% of the respondents) and 3-4 times a week (17% of the respondents). In the case of the *Malczyk* et al. study [21] it was respectively: 18.3%, 21.7% and 31.7% of the respondents. Meat consumption 3-4 times a week was declared by almost twice as many respondents as in the case of our own study. Perhaps this was due to the age of the respondents, who in this study were between 18 and 59 years old, i.e. they were older than those surveyed in our own study. A similar result to that in the own study was obtained by *Olszak* [23], in which students eating meat more than three times a week accounted for 33.5% of all respondents (in the own study it was 37%). Meat was eaten less than three times a week by 16.5% of the students, which is very similar to the results of our own study, in which 15.5% of the respondents ate meat with such frequency. Daily

consumption was declared by 33% of the respondents, which is 10% more than in the case of our own study.

Also in the case of examining the frequency of meat consumption, taking into account the division of respondents by gender, the researchers obtained different results. However, many studies have confirmed the relationship observed in our own study, i.e. the fact that women consume meat significantly less often than men. Such a conclusion was reached by researchers *Sidor* and *Rzymiski* [31], when 37.7% of the men surveyed consumed meat every day, while only 20.3% of the women surveyed. In our own study, it was 34% and 12%, respectively. Also *Szymandera-Buszka* et al. [35] confirmed the influence of gender on the frequency of consumption of products that are a source of thiamine in the study group of students, especially meat. The surveyed women declared meat consumption in much smaller amounts and with less frequency than men.

Many researchers have decided to conduct research on the frequency of consumption of meat or its particular types, taking into account only one gender. Much more often these were studies in which the study group consisted of women only. It is possible that this is due to greater willingness of women to complete questionnaires than men, or the desire to learn more about women's eating habits, due to the fact that they are usually responsible for shopping and preparing meals in households. In our own study, 17% of the respondents did not eat meat. In the study *Gajda* [8], only 2.8% of women declared not eating meat, i.e. 6 times less than in the case of our own study. A very similar result to that obtained in our own study was obtained by *Szymańska* et al [36], who found women eating meat several times a month accounted for 14.8% of the respondents. These researchers also obtained almost the same percentage of women declaring meat consumption less than once a month – 1.9% (in their own study it was 2% of women).

In our study, the frequency of meat consumption concerned not only meat in general, but also its various types, i.e. red meat and poultry. In our own study, the most frequently consumed meat by the respondents turned out to be poultry meat. The preference for poultry meat has also been confirmed in many other studies. *Kowalcze* et al. [13] indicated the surveyed students were more likely to eat poultry (65% of respondents) than red meat (35% of respondents). *Adamski* et al. [1] obtained the similar result. Poultry meat was consumed by 96% of the respondents, the majority of whom (84%) indicated boiler chicken meat as preferred. *Kulesza* et al. [15] analyzing the consumption of meat in students, showed that most of them preferred white meat. In the *Szczepańska* et al. study [34] almost every tenth of the respondents consumed poultry meat every day, half of the

respondents several times a week, and once a week or less often 37% of the respondents .

Many authors of studies confirm a higher frequency of meat consumption or its particular types by men compared to women, which can be psychologically determined [30]. However, these differences were not always statistically significant. In many studies, it can also be seen that women much more often prefer chicken or turkey meat, while men are particularly eager to eat pork. This may be due to greater care for health among women, and thus, paying more attention to the nutritional value of meat. This is confirmed by the study *Ilow et al.* [11] conducted at the Medical University of Wrocław. Researchers, evaluating students' preferences regarding the fat content of various food products, showed that 41% of respondents always chose low-fat meat, while 15.9% of women did not pay attention to the fat content of meat. Among men, it was respectively 18.5% and 30.8% of respondents. In the *Gacek et al.* study [7], which was also conducted among students, men significantly more often than women ate red meat. However, the frequency of poultry consumption declared by male and female students was similar. Most respondents of both sexes ate white meat once a week. On the other hand, the study in which there were no statistically significant differences in the frequency of consumption of white meat, taking into account the gender of the respondents, was the study of *Malczyk et al.* [20].

The frequency of fish consumption (including fatty and lean fish) was very low. 15% of respondents completely eliminated fish from their diets. This is slightly more people than in the case of not eating meat (13.5% of respondents). Reasons for eliminating fish from diet include: their high price, poor availability of fresh fish, limited culinary skills or insufficient knowledge about the health-promoting properties of fish. Occasional consumption of fish, several times a year, was indicated by 12% of respondents. These are probably people who eat fish mainly on holidays. Most of the respondents, almost 40%, declared the consumption of fish from one to three times a month. According to the current recommendations of healthy eating, fish (especially fatty and marine species) should be eaten twice a week. However, such frequency of consumption was declared by less than one tenth of the respondents.

In our own study, as many as 15% of respondents declared not eating fish (both fatty and lean). The largest percentage of the respondents, constituting 39%, declared consumption of fish from one to three times a month, and consumption in accordance with the applicable recommendations, i.e. twice a week, was declared by only 9.5% of young adults. In the study *Cichočka and Krupa* [4] conducted among slightly younger respondents, a low frequency of

fish consumption was also obtained. However, the surveyed adolescents were characterized by a slightly higher frequency of fish consumption than young adults in our own study. Not eating fish was declared by three times less high school students, and more than half of the respondents indicated that they eat fish once a week. However, in the *Cichočka and Krupa* study [4], most of the young people surveyed admitted that they eat fish once a week, which may be due to the fact that high school students use the school canteen. Serving fish once a week, traditionally on Friday, is quite a common phenomenon in Polish schools. However, our study examined the frequency of fish consumption by young adults. Therefore, it seems more reasonable to compare their answers with those of students or slightly older adults, rather than children or teenagers of school age. *Kulesza et al.* [15], examining the eating habits of students, showed, as in her own study, that the most frequently declared answer was the consumption of fish several times a month. In this study, slightly fewer respondents (nearly one tenth) did not eat fish at all. As in our own study, there were no people who would eat fish every day among the surveyed students. Other results were obtained by *Kowalcze et al.*[13], when more than half of the students ate fish at least once a week, while in their own study it was one third of the respondents.

As the results of our own study show, gender was not a statistically significant factor differentiating the frequency of fish consumption. A different conclusion was obtained *Gacek et al.* [7], in which men consumed fish significantly more often than women . Students usually ate them once a week, and female students 1-3 times a month. *Malczyk et al.* [20] also found statistically significant differences in the frequency of fish consumption, taking into account the gender of the respondents. However, they obtained different results compared to the previously cited study. In this case, female students significantly more often than female students ate fish.

The authors of other studies rarely addressed the frequency of consumption of different types of fish in their studies. The own study included a division into fatty fish (such as salmon, herring, mackerel and tuna) and lean fish (such as pike and zander). In most cases, the former fish species inhabit the seas and oceans, while a significant proportion of lean fish species are found in fresh waters. Thus, analyzing the *Stoś et al.* study [33], a comparison of the frequency of consumption of marine fish with oily fish, and freshwater fish with lean fish, was adopted. In this study, the consumption of saltwater fish once a week was declared by every fourth respondent, and freshwater fish by every tenth. In our own study, however, it was on average every fifth and also every tenth respondent. Our own results indicate respondents of both genders preferred

fatty fish and consumed it more often than lean fish. Purkiewicz et al. [27] came to different conclusions. In the case of the frequency of consumption of fatty fish, the gender of the surveyed young adults was indeed not a statistically significant differentiating factor. The situation was different in the case of lean fish, the consumption of which by men was significantly more frequent. Lean fish was consumed by a much smaller percentage of respondents than in the study Purkiewicz et al. [27]. It was only 11% of both men and women. Such differences may be due to the fact that in the cited study as many as 67% of the respondents were at risk of developing eating disorders. This could therefore explain the high consumption of lean fish as an alternative to fatty fish in the case of, for example, orthorexia or excessive reduction of fat in the diet. The small study group, in which only 15% of the respondents were men, could also have contributed to the frequent consumption of lean fish, especially by men.

CONCLUSIONS

Men significantly more often than women consumed both total meat, as well as red and poultry meat. It seems important to explore this result in the context of excessive consumption of meat (especially red meat) and the risk of lifestyle diseases in men.

Gender was not a factor differentiating the consumption of total fish, fatty and lean fish. At the same time, the frequency of fish consumption by young adults was very low, regardless of gender. It is justified to conduct a study to explain the reasons for low consumption and to propose possible nutritional education in this regard.

Given the complexity of the relationship between men and women's meat and fish consumption and health, research is needed to clarify the amounts of meat and fish consumed, the degrees and how they are processed, and the reasons for eating or not eating them. This can be helpful in directions for nutritional education.

Conflict of interest

The authors declare that there are no conflict of interest regarding the publication of this paper.

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Received: 24.08.2023

Accepted: 05.10.2023

Published online first: 23.10.2023