

IMPACT OF HEALTH AND NUTRITION RISKS PERCEPTION ON THE INTEREST IN PRO-HEALTHY FOOD ON THE EXAMPLE OF BREAD

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ABSTRACT

Background. Bread is a basic food product in the diet of a majority of people. It is a good source of energy and it is also abundant in carbohydrates. Simultaneously, because it is consumed on a large scale by Polish people, it provides large amounts of salt and some additives like preservative and raising agents. The perception of the risk influences the choice of food and impacts eating behaviors. However, it is still unknown if there is an impact of perceived risk on the choice and the consumption of bread.

Objective. The objective of the research was to assess the importance of perceived health and nutrition risk in conditioning the willingness to buy bread with decreased amounts of salt and bread without preservative and raising agents.

Material and methods. Empirical research was conducted in October 2014 in a group of 1,014 adult consumers, with the use of the method of interview. The questions covered the following issues: the frequency of white and wholemeal bread consumption, the willingness to consume bread with reduced salt content and one produced without the preservatives and raising agents, the self-assessment of health and socio-demographic characteristics of respondents. To evaluate the perceived health and nutrition risks modification of Health Concern Scale was used. Opinions on the tendency to purchase both kind of breads were compared taking into account socio-demographic characteristics, health risk, nutrition risk and frequency of eating white and wholemeal bread. To determine the differences ANOVA and Tukey post hoc test at the significance level of $p < 0.05$ were used. The relations between variables were assessed using Pearson's correlation coefficient.

Results. There was a higher tendency to consume bread without preservatives and raising agents than with low salt content. Women, people over 55 years old, and people who often consume white bread were characterized by higher willingness to consume bread with reduced salt content. People with higher education, aged over 45 years, and those who rarely consumed wholemeal bread were more willing to eat bread without additives. The greater was the nutrition and health risk perceived by the person, the greater was the willingness to consume both types of bread.

Conclusions. The importance of perceived risks in conditioning consumers' willingness to eat healthy food shows that the educational campaigns informing about risky behaviors may promote behavioral change towards a more favorable food choice.

Key words: consumer, health risk, nutrition risk, consumer behaviors

STRESZCZENIE

Wprowadzenie. Pieczywo jest podstawowym produktem w diecie większości ludzi. Jest dobrym źródłem energii i węglowodanów. Jednocześnie z powodu dużej konsumpcji pieczywa w Polsce, dostarcza ono dużo soli i może zawierać różne dodatki technologiczne, w tym dodatki konserwujące oraz spulchniające. Percepcja ryzyka związanego ze sposobem żywienia i zdrowiem oddziałuje na wybór żywności, także wykazuje związek z zachowaniami żywieniowymi. Brakuje natomiast badań na temat wpływu postrzeganego ryzyka na wybór i konsumpcję pieczywa.

Cel. Celem badania była ocena związku między postrzeganym ryzykiem zdrowotnym i żywieniowym a skłonnością do nabywania pieczywa o obniżonej zawartości soli oraz pieczywa bez dodatków konserwujących i spulchniających.

Material i metody. Badanie empiryczne przeprowadzono w październiku 2014 roku w grupie 1014 dorosłych konsumentów z wykorzystaniem metody wywiadu. W pytaniach uwzględniono następujące kwestie: częstość spożywania jasnego i ciemnego pieczywa, zamiar spożywania pieczywa o obniżonej zawartości soli oraz pieczywa bez konserwantów i środków spulchniających, samoocenę zdrowia i cechy socjodemograficzne badanych. Do oceny odczuwanego ryzyka zdrowotnego i żywieniowego wykorzystano modyfikację Skali Troski o Zdrowie (*Health Concern Scale*). Opinie na temat skłonności do

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nabywania pieczywa przedstawiono w postaci wartości średniej i odchylenia standardowego, a następnie porównywano je po uwzględnieniu cech socjodemograficznych, ryzyka zdrowotnego i żywieniowego oraz częstości spożywania pieczywa jasnego i ciemnego. Do stwierdzenia różnic wykorzystano jednoczynnikową analizę wariancji oraz test *post hoc* Tukeya przy poziomie istotności $p < 0,05$. Związek między zmiennymi oceniono za pomocą współczynnika korelacji Pearsona.

Wyniki. Stwierdzono większą skłonność do spożywania pieczywa bez dodatków konserwujących i spulchniających niż z obniżoną zawartością soli. Kobiety, osoby w wieku powyżej 55 lat oraz osoby często spożywające pieczywo jasne charakteryzowała większa skłonność do spożywania pieczywa o obniżonej zawartości soli. Osoby z wykształceniem wyższym, w wieku powyżej 45 lat oraz osoby rzadko spożywające pieczywo ciemne deklarowały większą skłonność do spożywania pieczywa bez dodatków. Im większe ryzyko żywieniowe i zdrowotne dostrzegały osoby, tym wykazywały większą skłonność do spożywania obydwu rodzajów pieczywa.

Wnioski. Istotne znaczenie postrzeganego ryzyka żywieniowego i zdrowotnego w warunkowaniu gotowości konsumentów do spożywania żywności o podwyższonych walorach zdrowotnych pokazuje, że kampanie edukacyjne informujące o ryzykownych zachowaniach mogą skutecznie promować zmianę w kierunku wyboru żywności bardziej korzystnej dla zdrowia.

Słowa kluczowe: konsument, ryzyko zdrowotne, ryzyko żywieniowe, zachowania konsumenckie

INTRODUCTION

Consumers perceive greater extent of risks caused by external factors over which they have no control, than individual factors or ones associated with their behavior or lifestyle [25]. And so, diet related diseases which represent a relatively high risk in the assessment of consumers are not regarded as a significant source of danger. By contrast, new technologies used in food production, and diseases caused by the presence of chemical substances are attributed greater risk than exists in reality. Consumers' awareness of the links between health, nutrition, and food is an important factor in their perception of risk [17].

According to consumers the risks associated with the food product is one of the most important factors in food selection and consumption [5]. However, the perception of risk associated with the nutritional habits also impacts the food choices, especially the choice of food which is intended to limit the occurrence of the adverse consequences of incorrect diet. In addition, perceived risk is linked with dietary behavior, both favorable and not favorable to health [9]. However, strong correlation between perceived risks and benefits of one's behavior is ascertained. Behaviors that provide many benefits are perceived as less risky and vice versa [7, 12].

Bread is a basic food product in the diet of a majority of people. Although it is an excellent source of energy and it is abundant in carbohydrates, it is characterized by a poor quantity and quality of proteins and in the case of white bread by a low content of dietary fiber. Simultaneously, due to large consumption among Polish population, it provides large amounts of salt and some additives like preservative and raising agents. Whereas is known that the perception of risk influences the choice of food and is also connected with eating behaviours, it is still unknown if the perceived risk has an impact on habits related to bread consumption.

The objective of the research was to assess the importance of perceived health and nutrition risk in conditioning the willingness to buy bread with decreased amounts of salt and bread without preservative and raising agents. Also socio-demographic characteristics and the frequency of eating white and wholemeal bread were included as differentiating variables.

MATERIAL AND METHODS

Empirical research was conducted in October 2014 in a group of 1.014 adult consumers with the usage of computer assisted personal interview (CAPI). Selection of the sample from the sampling address of GUS met the requirement of representativeness of the Polish general population for people over 21 years old with respect to age, gender, and size of their place of residence. Only people meeting the criterion of recruitment, which was making their own food purchases or taking part in making food purchases were qualified for the interview. The structure of the respondents is presented in Table. 1.

Respondents determined the frequency of consumption of white and wholemeal bread on a 7-point scale, where 1 - I do not know, 2 - never, 3 - 1–2 times a month, 4 - 1–2 times a week, 5 - 3–5 times a week, 6 - once a day, 7 - several times during the day. During the data analysis the answers were grouped into 3 categories, namely 1 - 1–2 times a month or less frequently; 2 - 1–5 times a week, 3 - once a day or more often.

The willingness of the respondents to consume the two kinds of bread, i.e. bread with reduced salt content and bread produced without the preservatives and raising agents, was determined on the 5-point scale, where 1 - no, 2 - rather no, 3 - neither yes nor so 4 - rather yes, 5 - yes.

In order to evaluate the perceived health risk some statements from the Health Concern Scale [15] and other concerning fiber issues were used, namely: "I am concerned about: 1/ gaining weight; 2/ risk for high

Table 1. Socio-demographic characteristics of respondents (%)

Socio-demographic characteristics	Groups of respondents	Numbers	(%)
Gender	female	552	54.4
	male	462	45.6
Place of residence	rural area	373	36.8
	town below 100 thousand inhabitants	314	31.0
	town above 100 thousand inhabitants	327	32.2
Education	lower than secondary	294	29.0
	secondary	465	45.9
	academic	255	25.1
Age	25 years and less	204	20.2
	26 - 35 years	208	20.5
	36 - 45 years	189	18.6
	46 - 55 years	146	14.4
	more than 55 years	267	26.3
Opinion on income	insufficient	202	19.9
	sufficient for some needs	578	57.0
	sufficient for all needs	234	23.1

blood pressure, 3/ risk for coronary heart disease; 4/ getting digestive problems". To evaluate the perceived nutrition risk three statements were utilized : "I am concerned about: 1/ getting many calories; 2/ getting too little fiber in my food; 3/ getting a lot of salt in my food". The respondents expressed their opinions on these statements on the 5-point scale, where 1 - no, 2 - rather no, 3 - neither yes nor no, 4 - rather yes, 5 - yes.

The respondents assessed their health condition by selecting one of three answers: "I have no major health problems"; "Sometimes I experience minor ailments"; "I remain under the care of a doctor".

The questionnaire also contains questions about socio-demographic characteristics of respondents, including gender, age, education, place of residence and opinion about their family's income.

Statistical analysis

Opinions on the willingness to consume both types of bread were presented as the mean value and standard deviation. Then the mean values were compared taking into consideration gender, age, education, place of residence and opinions about income.

In order to calculate the health risk index the sum of the ratings marked on the scales on the health risks was calculated (range: 4 - 20 points). Then using the tercile distribution intervals indicating low health risk (1st tercile - 10 points or less), medium risk (2nd tercile - 11 - 13 points) and high health risks (3rd tercile - 14 points and more) were extracted. Similarly, the sum of the nutrition risk assessments was computed (range: 3 - 15 points) Intervals indicating nutrition risk were extracted: low (3 - 7 points), medium (8 - 10 points) and high nutrition risk (11 - 15 points).

The analysis of variance (ANOVA) and Tukey *post hoc* test at the significance level of $p < 0.05$ were used to determine the differences between variables. The rela-

tions between variables were assessed using *Pearson's* correlation coefficient. To perform statistical analysis IBM SPSS Statistics, version 22.0, was used.

RESULTS

The study participants were characterized by a higher willingness to consume bread produced without the addition of preservatives or raising agents than bread with reduced salt content. The average scores ranging between ratings 3 (neither yes nor no) and 4 (rather yes) indicate a rather low interest in such proposals of modification of bread aiming at increasing its health values. Nevertheless, in the case of both products the large standard deviations reflect a large amount of variations in the group that is being studied (Table 2).

In the case of bread with decreased salt content women proved to be significantly more willing to consuming it than men. Moreover, people aged over 55 years were more willing to consume it compared with those aged under 35. Within the group aged 25 years and less the distributions of responses in relation to the mean were most polarized. People claiming that their family income is adequate for some needs were more willing to it such bread compared with those who acknowledged their income as insufficient. Participants' education and their place of residence did not statistically differ mean values expressing willingness to consume bread with lower salt content (Table 2).

In the case of bread produced without the use of preservatives and raising agents respondents with higher education turned out to be significantly more prone to consuming it compared to other people, similarly participants aged over 45 years were more prone compared to those aged under 25 and same with those living in cities up to 100 thousand residents as compared with residents

Table 2. Willingness to eat pro-healthy bread according to socio-demographic characteristics (mean value; standard deviation)

Socio-demographic characteristics	Bread with decreased salt content	Bread without addition of preservatives and raising agents
Total	3.4 ± 1.1	3.9 ± 1.1
Gender		
female	3.6 ^a ± 1.1	4.0 ± 1.1
male	3.3 ^a ± 1.2	3.8 ± 1.1
Education		
lower than secondary	3.4 ± 1.2	3.9 ^a ± 1.1
secondary	3.4 ± 1.1	3.9 ^b ± 1.1
academic	3.5 ± 1.1	4.1 ^{ab} ± 1.0
Age		
25 years and less	3.3 ^a ± 1.2	3.7 ^{ab} ± 1.2
26 – 35 years	3.3 ^b ± 1.2	3.9 ± 1.0
36 – 45 years	3.5 ± 1.2	3.9 ± 1.1
46 – 55 years	3.5 ± 1.1	4.0 ^a ± 1.0
More than 55 years	3.7 ^{ab} ± 1.0	4.0 ^b ± 1.0
Place of residence		
rural area	3.4 ± 1.2	3.8 ^a ± 1.1
town below 100 thousand inhabitants	3.5 ± 1.1	4.0 ^a ± 1.1
town above 100 thousand inhabitants	3.5 ± 1.2	3.9 ± 1.0
Opinion on income		
insufficient	3.3 ^a ± 1.2	3.9 ± 1.2
sufficient for some needs	3.5 ^a ± 1.1	3.9 ± 1.1
sufficient for all needs	3.4 ± 1.2	3.9 ± 1.0

$\bar{X} \pm SD$ – mean value ± standard deviation (5-point scale, where 1 – no, 2 – rather no, 3 – neither yes nor no, 4 – rather yes, 5 - yes)

^{a,b} – mean value in each table box with the same superscript differ significantly –Tukey post-hoc test at p<0.05

Table 3. Willingness to eat pro-healthy bread according to selected opinions of the population (mean value; standard deviation)

Selected opinions of the population	Bread with decreased salt content	Bread without addition of preservatives and raising agents
Frequency of white bread eating		
1-2 times a month or more seldom	3.3 ^a ± 1.2	3.9 ± 1.1
1-5 times a week	3.5 ^a ± 1.0	4.0 ± 1.0
once a day or more often	3.7 ^a ± 1.1	4.0 ± 1.1
Frequency of wholemeal bread eating		
1-2 times a month or more seldom	3.8 ^a ± 1.1	4.1 ^a ± 1.1
1-5 times a wee	3.5 ^a ± 1.0	3.9 ± 1.0
once a day or more often	3.2 ^a ± 1.2	3.8 ^a ± 1.1
Self-assessment of health		
I have no major health problems	3.3 ^{ab} ± 1.2	3.9 ± 1.1
Sometimes I experience minor ailments	3.6 ^a ± 1.1	4.0 ± 1.0
I remain under the care of a doctor	3.7 ^b ± 1.1	4.0 ± 1.0
Perceived health risk		
low	3.1 ^a ± 1.3	3.8 ^a ± 1.2
medium	3.4 ^a ± 1.1	3.9 ± 1.0
high	3.8 ^a ± 1.0	4.0 ^a ± 1.0
Perceived nutrition risk		
low	3.0 ^a ± 1.3	3.8 ^a ± 1.2
medium	3.5 ^a ± 1.0	3.9 ± 1.0
high	3.8 ^a ± 1.0	4.0 ^a ± 1.1

$\bar{X} \pm SD$ – mean value ± standard deviation (5-point scale, where 1 – no, 2 – rather no, 3 – neither yes nor no, 4 – rather yes, 5 - yes)

^{a,b} – mean value in each table box with the same superscript differ significantly –Tukey post-hoc test at p<0.05

of the villages. As in the case of bread with decreased salt content in the youngest group the distributions of responses in relation to the mean of willingness to eat bread without preservatives and raising agents were

most polarized. Gender and opinion on income did not statistically differ mean values expressing a tendency to eat bread without the addition of preservatives and raising agents (Table 2).

The more often the study participants ate white bread, the more prone they were to eating bread with lower salt content. In the case of the bread without additives, no significant differences was found. In contrast, the more often respondents ate wholemeal bread, the smaller was their willingness to consume bread with decreased salt content. People who eat wholemeal bread once a day or more frequently were characterized by significantly lower willingness to consume bread without the addition of preservatives and raising agents than those who ate such bread 1-2 times a month or more seldom. Those who reported lack of health problems declared lower tendency to eat bread with reduced salt content than people who declared the occurrence of any health problems (Table 3).

The greater health and nutrition risks associated with their way of eating was perceived by the subjects, the greater was their willingness to consume bread with reduced salt content. In the case of bread without the addition of preservatives and raising agents significant differences characterized only the opinions of those with extreme risk perception. Both people who perceived low health and nutrition risk were characterized by lower willingness to consume this bread compared with those declaring high risk. Simultaneously, the larger standard deviations inform that those perceived low nutrition and health risks presented more polarized opinions expressing their willingness to eat both kinds of bread in comparison with others (Table 3).

Opinions on the assessment of their health, frequency of eating white and wholemeal bread and the health and nutritional risk showed stronger bilateral correlations with the willingness to eat bread with reduced salt content than bread without the addition of preservatives and raising agents (Figure 1).

The strongest correlations were observed in the case of perceived health and nutrition risks and the

willingness to eat bread with decreased salt content. The higher the perceived risks were connected with the greater willingness to eat such bread. This result confirms that respondents were aware of the relationship between high salt intake and potential health risks.

DISCUSSION

The choice of food is conditioned not only by factors related to the food but also those connected solely with the consumer, including their knowledge and attitudes [28, 29]. On the one hand, past experience related to food, on the other hand the consumer's beliefs shaped by a variety of messages may have vast influence on one's willingness to consume innovative products. A higher willingness to consume bread produced without the addition of preservatives or raising agents than bread with reduced salt content may result from having little experience with products with reduced salt content [27], but also from giving the vital importance to the taste of the product when making a choice [4, 6, 16]. Webster [27] research showed that information on the reduced salt content without the opportunity to try the product, contributed to a lower acceptance of its taste. Greater willingness to consume bread with no additives which prolongs its durability and improves its structure may result from the increased importance of bread's naturalness for consumers [1, 19]. Furthermore, the quality of bread which can be found on the market is evaluated by consumers quite negatively [13] and thus, preservatives and raising agents used so far may be deemed insufficient to obtain a good quality of bread. The growing awareness of the negative health consequences due to the use of different technological additives is also the explanation of the results [11, 26].

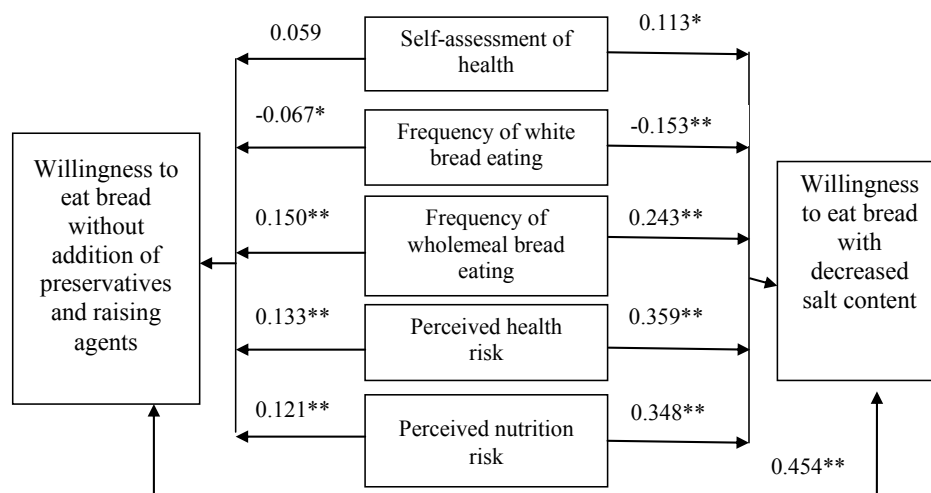


Figure 1. Correlations between selected opinions of respondents and declared willingness to eat pro-healthy bread (Pearson's correlation coefficient at * $p = 0.05$; ** $p = 0.01$).

Previous studies have shown the importance of socio-demographic characteristics in conditioning not only nutritional behaviours [28, 29] but also the acceptance of products with modified composition [3, 10, 14], which is also confirmed by the results obtained in this study. Older people were significantly more likely to consume both products. In the case of gender and income evaluation significant differences for bread with reduced salt content were indicated. The place of residence and education level differed significantly the willingness to eat bread without preservatives and raising agents. Thus, socio-demographic characteristics of people who are willing to accept both modification has confirmed the diverse importance of this group of variables in conditioning the beliefs, attitudes and behaviors [2]. Bearing in mind the reported differences, it can be said that women, the elderly and the more prosperous people showed more interest in pro-health modifications of food, which is confirmed in other studies [10, 18].

Past experience with food determine its choice to a large extent, which can be linked to a greater sense of security, but also to the habitual behavior [23]. In the survey, the frequency of eating white and wholemeal bread differed the willingness of the respondents to consume breads modified in its composition, but only in the case of the lower content of salt. The more often the respondents ate white bread, the more willing they were to eating bread with low salt content, while more frequent consumption of wholemeal bread was followed by the lower tendency to consume this kind of bread. A conclusion can be drawn from the obtained results that individuals consuming wholemeal bread should also accept the reduction of the salt content in bread, because they exhibit similar socio-demographic characteristics. Among them there are more women, people better educated and people with higher incomes [10, 18]. The factor that can explain the lower willingness to consume bread with low salt content among those frequently consuming wholemeal bread is their generally better health [24] who reported no health problems were characterized by lower willingness to consume bread with low salt content.

The perception of nutrition and health risks showed a stronger relationship with the presence of salt than of preservatives and raising agents in bread. The greater was the perceived health and nutrition risk related to nutritional habits, the more eager were the participants to consume bread with reduced salt content. People who perceived low health and nutrition risk were characterized by lower willingness to consume bread without addition of preservatives and raising agents compared with those declaring high health and nutrition risk. The importance of risk, both associated with food, as well as with one's own eating habits in conditioning of

food choices was indicated in previous studies [8, 21, 22]. People tend to accept the risks resulting from consuming new products, if it is under their control. This phenomenon may explain why they expect more labels that are understandable for them [7, 20].

CONCLUSIONS

1. The high perceived risks contributed to greater willingness to purchase bread with decreased contents of salt and one without preservative and raising agents. Moreover, perceived risks determined the tendency to eat bread with increased health benefits stronger than the health self-assessment and the frequency of bread consumption.
2. Women, people with higher education, and those more positively assessing their income were more willing to consume products with increased health benefits.
3. The importance of perceived risks in conditioning consumers' willingness to eat healthy food shows that the educational campaigns informing about risky behaviors may promote behavioral change towards a more favorable food choice.

Conflict of interest

The author declares no conflict of interest.

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