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CONSUMER BEHAVIOR RELATED TO SALT INTAKE IN THE REPUBLIC OF MOLDOVA

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Abstract. The objective of the study was to emphasize the consumers' attitude regarding the salt intake in Republic of Moldova. The Government of the Republic of Moldova has committed itself to reducing salt consumption at the national level among the population by 2020 to less than 8 g per day (a 30% reduction). This objective is provided in the National Action Plan for 2016-2020 and the National Program in the field of Food and Nutrition 2014 - 2020. The actions are part of the National Strategy for the Prevention and Control of Noncommunicable Diseases. Data collection was conducted in the period January 2020 and June 2020 through a questionnaire concerning this issue. The main objectives of the study were to identify foods that lead to high sodium intake in the adult population and to analyze practices, attitudes, behaviour and knowledge about salt consumption. It has been found that citizens consume excessive amounts of salt. About 90% of respondents are aware that excess intake of salt is associated with the incidence of adverse health conditions, more than 54% indicated they were trying to reduce their current intake of salt, and only 26% of respondents claimed to know the existence of a recommended maximum value of salt or sodium intake. The high salt intake is mostly caused by the consumption of highly processed food as meat, cheese, bread or preserved vegetables. Additional effort by providing information is required to increase consumers' knowledge about the effect of salt on health status, about products with a high salt content, and about the limit for salt intake.

Keywords: *salt intake, questionnaire, nutritional behavior, Republic of Moldova.*

Rezumat. Obiectivul prezentului studiu este de a sublinia atitudinea consumatorilor din Republica Moldova cu privire la aportul de sare. Guvernul Republicii Moldova s-a angajat să reducă consumul de sare la nivel național în rândul populației până în 2020 la mai puțin de 8 g pe zi (o reducere de 30%) conform Planului național de acțiune pentru 2016-2020 și Programului național în domeniul alimentației și nutriției 2014-2020. Colectarea datelor a fost efectuată în perioada ianuarie-iunie 2020. Chestionarul a vizat identificarea alimentelor

cu un aport ridicat de clorură de sodiu la populația adultă, analiza practicilor, atitudinilor, comportamentului și cunoștințelor despre consumul de sare. Drept rezultat, s-a constatat un consum excesiv de sare. Aproximativ 90% dintre respondenți sunt conștienți de faptul că aportul excesiv de sare este asociat cu incidența unor condiții adverse de sănătate, mai mult de 54% au indicat că încearcă să reducă consumul actual de sare și doar 26% dintre respondenți au susținut că știu despre existența valorii maxime recomandate a aportului de sare. Consumul de alimente înalt procesate, în special de carne, brânză, pâine sau legume conservate contribuie cel mai mult la majorarea acestui indicator. Așadar, este necesar un efort suplimentar prin furnizarea de informații pentru a spori cunoștințele consumatorilor despre efectul sării asupra stării de sănătate și produselor cu un conținut sporit de sare.

Cuvinte-cheie: *aport de sare, chestionar, comportament nutrițional, Republica Moldova.*

Introduction

The world is facing a nutritional crisis: about three billion people in each of the world's 193 countries have poor quality food.

Poor diet and low level of physical activity are among the four main causes of the onset and development of noncommunicable diseases [1]. We are talking about cardiovascular disease, high blood pressure, type 2 diabetes, stroke, musculoskeletal disorders, certain types of cancer and mental disorders. Looking at the long term, the increase in morbidity from noncommunicable diseases will negatively impact life expectancy and reduce quality of life [2].

Adults should consume less than 2,000 mg of sodium, or 5 grams of salt per day, according to guidelines published by the WHO. But most adults around the world have an average daily salt intake of over 6g, and many in Eastern Europe and Asia over 12g. Salt intake among adults in Moldova exceeds twice the WHO recommended maximum target of 5g per day. WHO has set a 30% reduction in global salt consumption as a target for 2025 in its Global Plan of Action to Support Government's Efforts to Eliminate Noncommunicable Diseases [3].

The increased salt consumption is the cause of the considerable long-term complications, which have a major physical, mental, social and economic impact. It causes the onset and development of a range of non-communicable diseases, including high blood pressure.

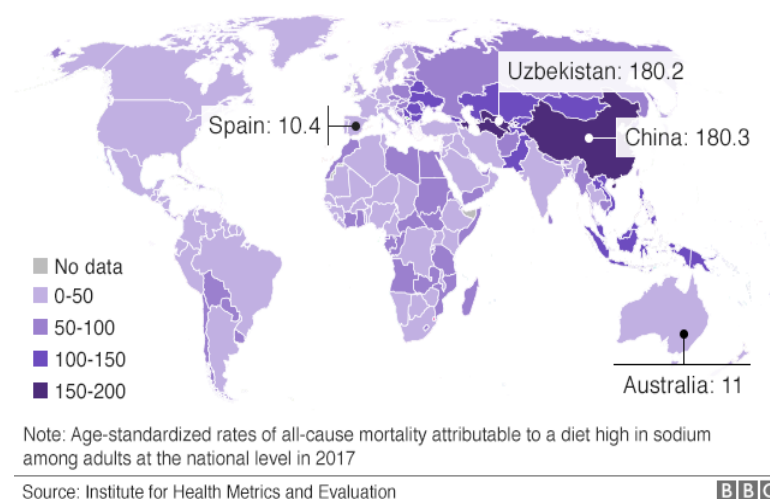


Figure 1. The level of global mortality caused by excessive salt consumption [4].

Analyzing the sodium content of urine in 100,000 people in 18 countries on 5 continents, research has shown that those who consume significant amounts of sodium have higher blood pressure than people with low sodium intake. Also, tests performed on the same number of people showed that those who consumed more than 7 grams of salt daily had a higher risk of heart disease and premature death than people who consumed 3 - 6 grams per day.

Materials and Methods

In order to highlight the peculiarities of the consumption of foods with high salt content among the adult population, a questionnaire was conducted regarding the consumption of salted processed foods. This questionnaire aims to assess the nutritional intake of the middle-aged population in Republic of Moldova, especially the consumption of processed foods with high salt content and to know the consequences of their use (Table 1). The questionnaire was divided into 3 main sections: the first section of questions referred to the demographic characteristics of the participants (age, gender, monthly income and living environment). The next section was intended to assess salt consumption among participants, their attitude related to salt intake and the frequency of consumption of products that are blamed for a high salt content. The last section of the questionnaire was meant to reveal the relationship between salt intake and health problems. The study involved a total of 1040 respondents of both sexes, representing people from both urban and rural areas. The age is between 18 and 60 years. The correctness of the results is ensured both at the average level of residence (rural / urban) and by age and gender (18 - 29; 30 - 44; 45 - 59; 60 - 69 years).

Salt is found naturally in a variety of foods, such as milk, meat, and shellfish. It is often found in high amounts in processed foods such as breads, crackers, processed meats and snack foods and in many condiments (eg, soy and fish sauces). Thus, a diet high in processed foods and low in fresh fruits and vegetables is often high in sodium.

Table 1

Approximate amount of sodium in various food groups.

Food group	Sodium content, mg / 100 g
Table salt, baking soda, baking powder	3 000
Bouillon cubes, powdered soups, soups, gravy	20 000
Soya sauce	7 000
Snacks (e.g. pretzels, cheese puffs, popcorn)	1 500
Bacon	1 500
Cheese, hard / soft	800/400
Butter / margarine	500
Processed fish	400
Céréales et produits céréaliers (p. ex. pain, céréales pour petit déjeuner, biscuits, gâteaux, pâtisseries)	250

Source [5 - 7].

Results

Analysis of the questionnaire on the consumption of foods high in salt

The study highlights the current situation in the Republic of Moldova in terms of nutrition of the middle-aged population in the Republic of Moldova. The object of the chosen study represents statistical data that are obtained from the questionnaire with questions regarding the salt content in consumed food products, mainly the processed ones. It is known that the quality of food is directly proportional to individual income, so one of the questions of the questionnaire was to assess the financial income of respondents. Depending on the income of the respondents, it can be specified that people who have unsatisfactory income are less privileged in terms of excessive salt consumption, due to the impossibility of procuring quality food. Thus, these people are less likely to develop high blood pressure during life. On the other hand, unsatisfactory incomes among the population can also be an indicator of the low level of the current nutritional culture.

When analyzing the monthly income of the respondents, the following peculiarities were found: 3.8% of the persons mentioned that they have monthly income at an excellent level. About 21.2% of respondents claim that they have unsatisfactory monthly income. Most of the participants in the study (69.2%) benefit from a satisfactory monthly income (Figure 2). Salt consumption is often associated with hypertension and high blood pressure. Observational epidemiologic studies have reported an independent and inverse association between physical activity and the risk of hypertension. Several studies have shown that physical activity lowers blood pressure in normotensive and hypertensive individuals [8 - 12].

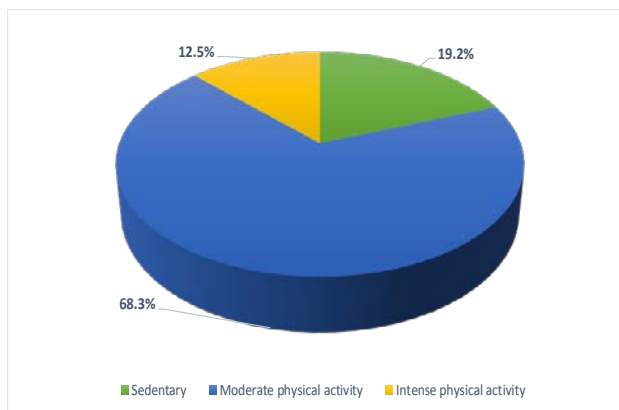
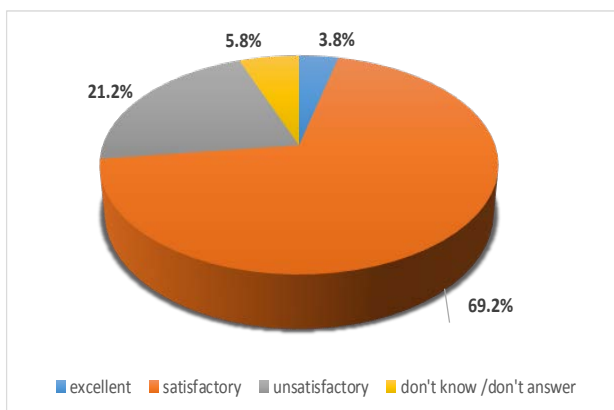


Figure 2. Analysis of monthly financial income of respondents. **Figure 3.** Percentage share of the level of physical activity among the respondents.

The level of physical activity of the respondents was assessed according to specific features. Thus, most of the participants in the questionnaire (68.3%) have a moderate physical activity lifestyle; 19.2% of respondents are physically inactive or have a sedentary lifestyle. Among all participants in the study, there was a percentage of 12.5% of people who have a lifestyle and intense physical activity (figure 3).

Consumption of foods high in salt was assessed by questions about the daily allowable amount of salt, any health problems that could be caused by excessive salt intake, the type and frequency of salt use in the diet.

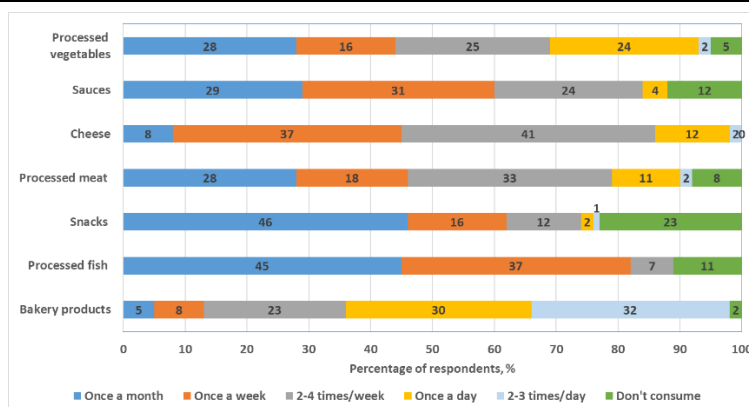


Figure 4. Distribution of the types of processed products according to the frequency of consumption.

Participants were also asked about the frequency and types of processed foods consumed with a high salt content (sausages, sauces, processed vegetables, cheeses, etc.). At the end, the participants had the options to express themselves regarding the monitoring of salt consumption and the actions taken to reduce the control of the amount of salt ingested.

Consumption of high salt products distributed in groups, consumed by participants

Each 100 g of bread consumed increases the amount of salt ingested by 1.85 g. In the context in which in the Republic of Moldova, the average consumption of bread is 300 g / day, it contributes to increasing the daily amount of salt consumed more than the one recommended by the WHO (5.55 g compared to 5 g) [13]. Cheeses and sausages, per 100 g of product, on average contribute to the consumption of salt by 1.88 g. Ice cream and pastries also increase the amount of salt daily [6, 14].

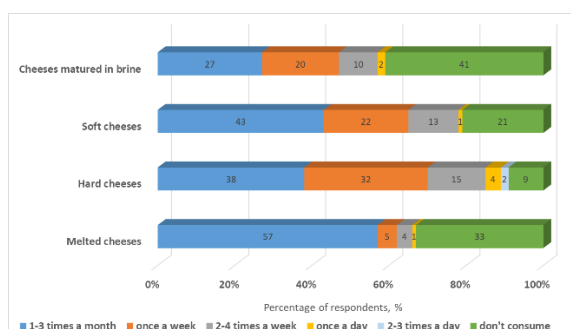
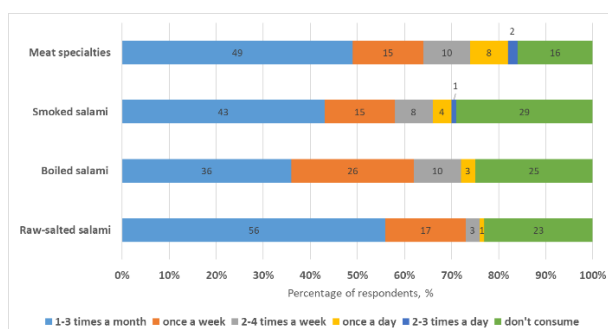


Figure 5. Types of processed meat products and their frequency of consumption. **Figure 6.** Frequency of cheese consumption depending on their type.

Processed meat products are not so popular among respondents. Thus, smoked salamis, canned meat and drums are not consumed at all by more than 50% of respondents. Raw-salted salami, boiled salami and smoked salami are consumed mainly 1 - 3 times a month (figure 5). About 10% of the respondents consume 2 - 4 times a week each of the mentioned products. A higher share of consumption among consumers is represented by meat specialties. 8% of respondents use these products once a day, 10% - 2-4 times a week, and 15% of respondents consume meat specialties once a week.

The percentage of respondents who consume harder cheeses is higher than those who consume soft cheeses (figure 6). The harder the cheeses, the higher the salt content. At least 32% of respondents say they use such cheeses once a week, and 2% consume them

even a few times a day. As the salt concentration in cheeses decreases, so does their consumption. One reason for this decline is the availability of hard cheeses in a wider range on the local market and at a reasonable price, while soft cheeses with a lower amount of salt are at a high price and in a lower variety.

Regarding the consumption of bread (figure 7), it can be deduced that with the increase of the degree of refining of the raw materials from which it is made, the frequency of consumption of a certain type of bread increases. Thus, white bread is frequently consumed by a larger number of respondents, about 19% of whom consume it daily. Lower consumption is recorded for wholemeal bread, rye, pita bread and French sticks.

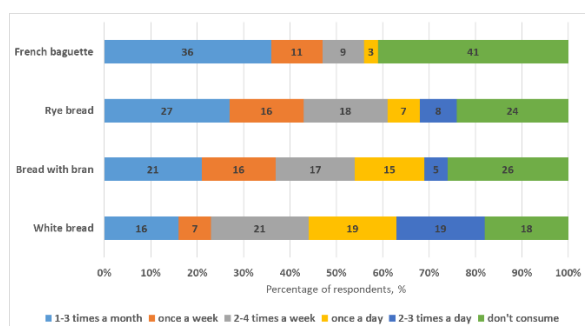


Figure 7. Consumption of different types of bread depending on frequency.

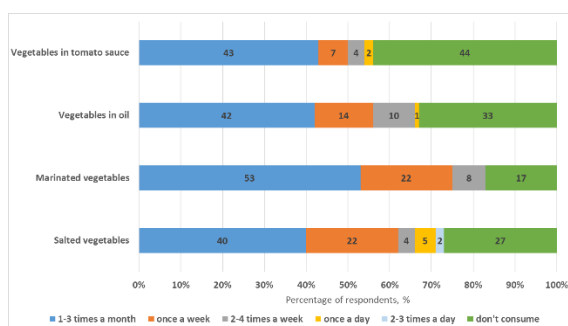


Figure 8. Types of processed vegetables consumed by respondents.

A study on processed products and mortality, carried out on 20,000 people in Spain, aged between 20 and 91, has been carried out in the last 10 years. During this time, 355 people died. It has been found that people who consume the most processed foods and high in salt (every day) are much more likely to be obese, smokers, diabetics, hypertensives, depression and hypercholesterolemia. Compared to people who eat moderately processed foods, those who eat them frequently have a 12% higher risk of cardiovascular disease, 13% -coronary heart disease, 11% stroke [15].

For the Republic of Moldova, various ways of preserving vegetables for the winter season are traditional. Depending on the preservation process, the amount of salt in processed vegetable products is variable and consumers have a normal or excess intake depending on the quantity and frequency of consumption of these products (figure 8). In the case of vegetables preserved by salting, most of the respondents (40%) consume them rarely – 1-3 times per month, 5% of respondents consume them daily, 2% - more often than once a day, and 22% of consumers include them in their diet once a week. Marinated vegetables are consumed less often, 53% of respondents using them 1 - 3 times a month, 22% - once a week and 4% consumers - 2-4 times a week. Daily consumption of marinated vegetables is not recorded.

Potential health problems caused by foods high in salt

Inappropriate program of sodium intake increases the blood pressure and the incidence of hypertension, but is also associated with an increased rate of morbidity and mortality from cardiovascular diseases [16, 17].

Eating behavior regarding the consumption of foods with a high salt content was assessed by daily, weekly and monthly consumption. Increasing the frequency of

consumption of these types of products increases the risk of cardiovascular disease and inflammation.

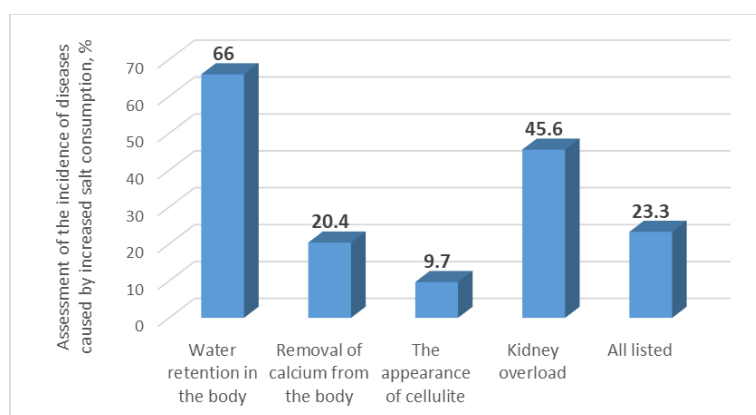


Figure 9. Assessment of the main diseases caused by excessive salt consumption.

Most respondents, 91.3%, believe that excessive salt consumption could harm health. In this context, the main health problems caused by salt consumption were identified. About 66% of respondents believe that water retention in the body is the main consequence of high salt intake, 45.6% believe that overuse of the kidneys can occur, and 20.4% of respondents say that salt could remove calcium from the body.

Highlighting the types of salt consumed by respondents

In order to avoid the deficiency of micronutrients like iodine or iron, in many cases salt is a carrier of this micronutrients. Iodine is a micronutrient that is difficult to obtain in a normal diet during pregnancy and infancy, given the higher requirements. The consequences are serious – iodine deficiency is the most preventable cause of brain damage and intellectual disability in children. According to WHO, the recommended daily intake of iodine is best met by fortifying salt with iodine in countries where the problem of iodine deficiency is widespread. Most table salt also has added iodine, an essential nutrient that helps maintain a healthy thyroid [18]. Sea salt and plain table salt have the same basic nutritional value, despite the fact that sea salt is often promoted as being healthier. Sea salt and table salt contain comparable amounts of sodium by weight. Figure 6 highlights the type of consumed salt among the questionnaire respondents. The percentage of adults who use iodized salt in their diet is the highest, at 77.8%.

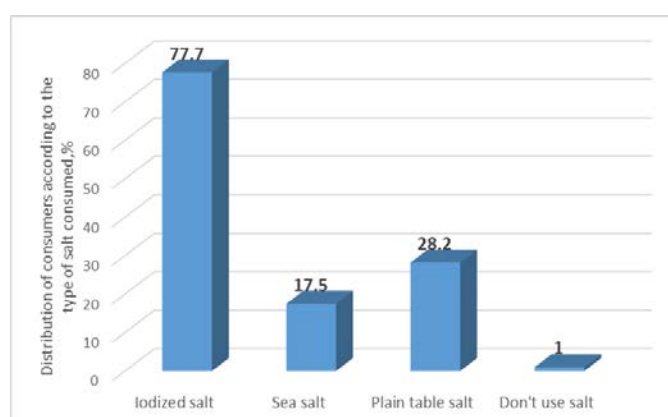


Figure 10. Distribution of consumers according to the type of salt consumed.

This is followed by sea salt, with values of 28.2%, and the percentage of people who use plain table salt is 17.5%. This is due to the diversification in recent years of the variety of marketed salt and the possibility of free choice of the consumer.

It also identifies a percentage of people who do not use added salt in their dishes at all. Although this percentage is small compared to the others, it can be said that this minority is aware of the potential risks to the body or is informed about the presence of the daily dose of salt in the food by default, without adding more.

Precautions to reduce salt intake

Government policies and strategies should create environments that enable populations to consume adequate quantities of safe and nutritious foods that make up a healthy diet including low salt. Improving dietary habits is a societal as well as an individual responsibility. It demands a population-based, multisectoral, and culturally relevant approach.

Key broad strategies for salt reduction include:

- government policies - including appropriate fiscal policies and regulation to ensure food manufacturers and retailers produce healthier foods or make healthy products available and affordable;
- working with the private sector to improve the availability and accessibility of low-salt products;
- consumer awareness and empowerment of populations through social marketing and mobilization to raise awareness of the need to reduce salt intake consumption;
- creating an enabling environment for salt reduction through local policy interventions and the promotion of “healthy food” settings such as schools, workplaces, communities, and cities;
- monitoring of population salt intake, sources of salt in the diet and consumer knowledge, attitudes and behaviors relating to salt to inform policy decisions [19 - 21].

Salt reduction programs and programs that promote fortification with micronutrients of salt, condiments or seasonings high in salt (bouillon cubes, soy and fish sauce) can complement each other [22].

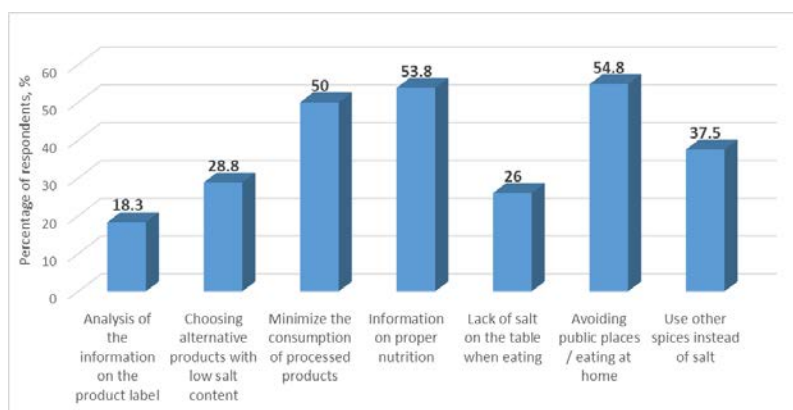


Figure 11. Percentage of interviewers who take various measures to control salt consumption.

Also, through questionnaires, was assessed the level of awareness of the population regarding salt consumption. Respondents were offered a series of measures that can prevent excessive salt consumption. Salt consumption at home can be reduced by: not adding salt during the preparation of food; not having a salt shaker on the table; limiting the consumption of salty snacks; choosing products with lower sodium content.

In the context of these comparative data, the population can take some measures to control the amount of salty foods they consume. Thus, 54.8% of respondents do not eat in public places, and 50% claim that it minimizes the consumption of processed products. Due to the fact that most respondents are from urban areas, access to information is well highlighted. For this reason, about 53.8% of respondents are regularly informed about the diet they should or should not adopt. Likewise, taking into account the variety of products labeled in supermarkets, 28.8% of respondents purchase alternative food products with a low salt content.

Conclusions

Respondents' attitudes, practices and knowledge of how processed foods are consumed were assessed. Their analysis led to the implementation of measures and rules to improve nutrition in order to minimize the incidence of diseases associated with excessive salt consumption. It was found that the participants in the questionnaire are aware of the risks and potential diseases caused by the consumption of processed foods rich in salt. Of all the products with a high salt content, bread, as a staple food, is more frequently consumed than other processed products.

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References

1. Chirsanova A., Reșitca V. *Factori de bază ce influențează politicile alimentare și nutriționale la nivel internațional*. Universitatea Tehnică a Moldovei. Meridian ingineresc. Nr.3, 2013, ISSN 1683-853X. p.86-90. https://utm.md/meridian/2013/0_Meridian_Ingineresc_nr3_2013.pdf
2. Calcatiniuc D., Grițco C., Chirsanova A., Boiștean A, The impact of organic food on the moldovan market, International Scientific Conference on Microbial Biotechnologi 4th edition, Chisinau, Moldova, October 11-12, 2018 , ISBN 978-9975- 3178-8-7 p.78 http://www.imb.asm.md/uploads/File/Biotechnolog_Conference.pdf
3. Rastoin Jean-Louis, *Dynamique du système alimentaire*. Montpellier SupAgro 2009.
4. Carnethon MR, Evans NS, Church TS, et al. *Joint associations of physical activity and aerobic fitness on the development of incident hypertension: coronary artery risk development in young adults*. Hypertension. 2010;56(1). p. 49–55. [PMC free article] [PubMed] [Google Scholar].
5. Whelton SP, Chin A, XIN X, et al. *Effect of aerobic exercise on blood pressure: a meta-analysis of randomized, controlled trials*. Ann Intern Med. 2002;136(7). p. 493–503. [PubMed] [Google Scholar]
6. Jones DW. *Dietary sodium and blood pressure*. Hypertension. 2004;43(5). p. 932–935. [PubMed] [Google Scholar]
7. Elliott P, Stamler J, Nichols R, et al. *Intersalt revisited: further analyses of 24 hour sodium excretion and blood pressure within and across populations*. BMJ. 1996;312(7041). p. 1249–1253. [PMC free article] [PubMed] [Google Scholar]
8. Sacks FM, Svetkey LP, Vollmer WM, et al. *Effects on blood pressure of reduced dietary sodium and the Dietary Approaches to Stop Hypertension (DASH) diet*. DASH-Sodium Collaborative Research Group. N Engl J Med. 2001;344(1). p. 3–10. [PubMed] [Google Scholar]
9. Boaghi E, Capcanari T., et al. *The evolution of food products consumption in Republic of Moldova in the demographic transition period*. Journal of Engineering Science. Food engineering. Vol. XXV, no. 4 (2018), pp.

- 74 – 81. DOI:10.5281/zenodo.2576744. https://jes.utm.md/wp-content/uploads/sites/20/2019/03/JES-2018-4_74-81.pdf
10. Kloss L., Dawn Meyer J., et al. *Sodium intake and its reduction by food reformulation in the European Union – A review*. NFS journal1 2015 p. 9-19.
https://www.researchgate.net/publication/315378765_Sodium_Intake_and_Its_Associated_Factors.
 11. Nerbass F. B., Pecoits-Filho, et al. *Demographic associations of high estimated sodium intake and frequency of consumption of high-sodium foods in people with chronic kidney disease stage 3 in England*. Journal of Renal Nutrition, 24(4), 2014. p. 236-242
 12. Hin & Khor. *Influence of food intake and eating habits on hypertension control among outpatients at a government health clinic in the Klang Valley, Malaysia*. Malaysian Journal of Nutrition, 17(2), 2011. p. 163-173.
 13. Anderson C. A., Appel L. J., et al. *Dietary sources of sodium in China, Japan, the United Kingdom, and the United States, women and men aged 40 to 59 years: The INTERMAP study*, 2010.
 14. Pocol C.B.; Ciobanu E. et al. *Comportamentul de consum alimentar în rândul tinerilor. Raport de cercetare. Project “Réseau Régional Francophone sur la Santé, la Nutrition et la Sécurité Alimentaire (SaIN)” Financed by AUF*. 2018. <https://www.auf.org/europe-centrale-orientale/>
 15. Dunn John T. *Guarding our nation's thyroid health*. The Journal of Clinical Endocrinology & Metabolism 87, no. 2, 2002: p. 486-488.
 16. Elliott P. *Sodium intakes around the world*. Background document prepared for the Forum and Technical meeting on Reducing Salt Intake in Populations. Geneva, World Health Organization, 2007.
 17. *Salt reduction and iodine fortification strategies in public health: report of a joint technical meeting convened by the World Health Organization and The George Institute for Global Health in collaboration with the International Council for the Control of Iodine Deficiency Disorders Global Network*, Sydney, Australia, March 2013. Geneva: World Health Organization; 2014
http://apps.who.int/iris/bitstream/handle/10665/101509/9789241506694_eng.pdf?sequence=1
 18. Hotărâre nr. 1000 din 23.08.2016 Cu privire la aprobarea Programului național de promovare a sănătății pentru anii 2016-2020 din 26.08.2016 / Monitorul Oficial nr. 277-287 art. 1086.
 19. Hotărâre nr. 82 din 12.04.2012 Pentru aprobarea Strategiei naționale de prevenire și control al bolilor netransmisibile pe anii 2012–2020 / MO nr.126-129/ 412 din 12.04.2012.
 20. Ordin nr.638 din 12.08.2016 Cu privire la implementarea recomandărilor pentru un regim alimentar sănătos și activitate fizică adecvată în instituțiile de învățământ din RM.
 21. WHO. *Sodium intake for adults and children*. Geneva, Guideline 2012
 22. WHO. Geneva, 2012. Guideline: *Sodium intake for adults and children*