

## Behavior of Consumers in the Republic of Moldova Related to the Consumption of Trans Fat

Research Article

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### Abstract

The objective of the study was to highlight the behavior of consumers in the Republic of Moldova regarding trans fats. Data collection was carried out between May 2020 and August 2020 through a questionnaire on this issue. The main objectives of the study were to identify foods high in trans fats preferred by the adult population and to analyse practices, attitudes, behavior and knowledge about the consumption of trans fats. It was found that the citizens of the Republic of Moldova consume ten times more trans fats than the daily limit recommended by the WHO. This leads to an increase in the number of cases of cardiovascular disease and obesity, which, in the context of the COVID-19 pandemic, considerably increases the risk of severe complications. It should be noted that the specific traditional range of fats used for cooking in households remains dominated by sunflower oil (n 949/77.15%), and tallow and lard are still used with a dangerous frequency (n 189/15.39%). Same time, the consumption of foods with trans fat content is dominated by: salty and sweet biscuits, cookies; chips, french fries, burgers, frozen dough - puff pastry or for pizza and others.

**Conclusions:** Further effort is needed to provide information to raise awareness among Moldovan consumers about the effect of trans fats on their health and to limit their consumption.

**Keywords:** Trans Fats; Questionnaire; Nutritional Behavior; Republic of Moldova.

### Introduction

Trans unsaturated fatty acids, or TFAs, are solid fats produced artificially by heating liquid vegetable oils in the presence of a metal catalyst and hydrogen. This process, partial hydrogenation, causes carbon atoms to bond in a straight configuration due to the addition of hydrogen at the double bonds, which eliminates the unsaturated bond and makes it a saturated bond [1, 2]. As a result, the oil remains in a solid state at room temperature. Partial hydrogenation of vegetable oil is also used to destroy some fatty acids, such as linolenic acid and linoleic acid, which can oxidize and cause fat to become rancid. Since the first successful hydrogenation of oils was reported in 1897, there has been a steady increase in the amount of TFAs appearing in the human's diet. Common sources of TFAs include shortenings, stick margarines, baked goods (cookies, breads, pastries), fried fast foods (french fries), and other prepared foods. In addition, TFAs occur naturally at relatively low levels in meat and dairy products as a by-

product of fermentation in ruminant animals [3].

At the same time, the increasing consumption of processed foods containing trans fatty acids leads to the signaling of several harmful effects on health. This has motivated decision-makers in many countries to take action. It should be noted that in the last 15 years, progress has been made in reducing the intake of AGT [4, 5]. In 2003, Denmark was the first country to adopt a law restricting the AGT content of all ready-to-eat foods and meals, imposing a maximum of 2% of the total fat content [6]. Canada and the United States, where the daily intake of AGT was twice the WHO recommended limit of 1% of energy intake, were among the first countries to introduce mandatory labeling of TFA in packaged foods in 2003 [7, 8]. National restrictions, many local jurisdictions in the United States, such as New York City, have restricted TFAs in food service units, including restaurants, catering, mobile food sales units, and mobile food commissioners [9]. To date, about 40 countries, most of which are high-income or

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middle-income countries, have adopted the mandatory restriction of AGT, banned the use of partially hydrogenated oils and called for mandatory labeling of TFAs on packaged foods as shown in Figure 1 [10].

### The national context

The Republic of Moldova is facing the double burden of malnutrition [11]. On the one hand, malnutrition and nutritional deficiencies, characteristic for developing countries, on the other hand - overweight and obesity, characteristic of developed countries. 6% of children up to 5 years of age have stature retardation, conditioned by chronic energy insufficiency, and one fifth of children suffer from anemia [12]. About a third of women of childbearing age and more than 40% of pregnant women have anemia. Half of the adult population is overweight or obese [13]. Currently, people in Moldova consume ten times more trans fat than the daily limit recommended by the WHO. This leads to an increase in the number of cases of cardiovascular disease and obesity, which in the context of the COVID-19 pandemic, considerably increases the risk of severe complications.

Saturated fats and trans fats, which have much more pronounced atherogenic properties, are widely used in the food industry. Current labeling legislation does not provide for mandatory consumer information on the content of salt, sugar, saturated fats and trans fats in food. Promoting nutritional health is not considered a priority. Actions to inform the population about healthy food consumption are carried out chaotically. Nutrition is not a mandatory part of the education curriculum in educational institutions [15, 16].

Although there are some fragmentary elements of status oversight nutritionally, they are insufficient. It is necessary to establish a functional and sustainable system of surveillance, monitoring and evaluation in the field of nutritional health, nutritional status and the determinants that influence them, as well as their trends in time and space. National studies, which include indicators of nutritional status, are dependent on external donations, are unplanned and do not include all the necessary indicators, and existing indicators cannot be disaggregated enough to address issues of inequality [17].

### Materials and Methods

To achieve the objectives of the research, a sociological survey was conducted based on a questionnaire. Thus, the peculiarities of consuming foods rich in trans fats were highlighted among the adult population of the Republic of Moldova. The questionnaire was divided into 3 main sections: the first section of the questions referred to the demographic characteristics of the participants (age, sex, monthly income, residence and standard of living). The next section was intended to assess the consumption of trans fats among respondents, their attitude towards trans fats and the frequency of consumption of products that are accused of a high content of hazardous fats. The last section of the questionnaire was designed to elucidate the relationship between trans fat consumption and health problems. The study involved a total of 1230 respondents. In order to have a more complete picture of the respondents, the body mass index (BMI) was calculated as the cornerstone of the current classification system for obesity

and its advantages are widely exploited in various disciplines, from international surveillance to individual assessment of the patient or consumer.

Of all the aspects included in the questionnaire, only those relevant to describe the sustainability of food consumption were selected in the statistical analyses. Respectively: a diet more abundant in fruits and vegetables and more deficient in products of animal origin, a more frequent consumption of healthy foods and a food intake that promotes conviviality.

Respondents' attitudes, practices and knowledge about how processed foods and especially those containing trans fats are consumed, were assessed. Their analysis led to the implementation of measures and rules to improve nutrition, to minimize the incidence of diseases associated with excessive consumption of trans fats. Respondents were shown to be aware of the potential risks and diseases caused by eating processed foods high in trans fats. Of all the products with a high content of trans fat are: salty and sweet biscuits, cookies; burgers; fries; chips; puff pastry or frozen pizza.

### Results and Discussions

The food model and nutritional status of consumers in the Republic of Moldova were assessed using the questionnaire. One thousand two hundred thirty (1230) consumers (respondents), both men ( $n = 588$ ; 47.8%) and women ( $n = 642$ ; 52.2%), participated in the study. Information was obtained on sociodemographic characteristics, eating habits and anthropometric measurements.

The average age of the respondents was  $35.16 \pm 1.6$  ranging from 20 to over 61 years. A proportion higher than 289 (23.5%) is considered to be in the 20-25 age group. The lowest proportion of respondents 4 (0.3%) belongs to the age group  $\geq 61$  years. More than half of the 642 respondents (52.2%) were women. Most of the 1223 (99.4%) respondents were Orthodox Christians and 7 (0.5%) did not want to answer, the data presented in Table 1.

Dietary pattern is the general profile of food and nutrient consumption which is characterized on the basis of the usual eating habits. The analysis of dietary patterns gives a more comprehensive impression of the food consumption habits within a population [18].

Nutritional status is the sum total of an individual's anthropometric indices as influenced by intake and utilization of nutrients, which is determined from information obtained by physical, biochemical, and dietary studies. It is a result of interrelated factors influenced by quality and quantity of food consumed and the physical health of the individual [19, 20]. Although BMI has many limitations that we professionals have chosen to ignore or at least tolerate, we have done so on the grounds that its advantages have outweighed its disadvantages. The current situation is that BMI-based recommendations in international guidelines are generally accepted as providing a valuable additional perspective on the issue [21, 22].

According to WHO designations, the body mass index is classified into categories corresponding to the different weight states

valid for women and men as shown below the data presented in Table 2.

According to the reported data on prevalence risk factors for non-communicable diseases in the Republic of Moldova (for 2013) as a result of the physical measurements, it was established that six out of 10 respondents were overweight (body mass index  $\geq 25$  kg/m<sup>2</sup>), without differences between the sexes. One in five respondents (22.9%) was obese (body mass index  $\geq 30$  kg/m<sup>2</sup>), and the proportion of obese women (28.5%) was 1.6 times higher than that of men (17.8%). The average value of the body mass index was 26.6 kg/m<sup>2</sup> [23].

The study conducted by the authors of this article found that only 501 (40.7%) of respondents had a normal nutritional status, and 729 (59.3%) had deviations, including: underweight - 84 (6.8%), overweight 465 (37.8%) and obese 180 (14.7%). The proportion of obese women 131 (72.77%) was 2.67 times higher compared to that of men 49 (27.23%) which indicates that the gap between women and men has widened even more compared to 2013 [24].

Given this classification, the respondents were divided according

to the type of their body condition, the data presented in Table 3. Given that the main objective of this study was consumer behavior related to trans fats, we considered it appropriate to examine the types of oils used in cooking in the household of respondents proposing to make the choice from the specific traditional assortment used. Thus 949 (77.15%) gave preference to sunflower oil, and 189 (15.39%) more often use tallow and lard. About 1 percent frequently use margarine, butter or other fats. The results obtained are shown in Figure 2.

It should be noted that of all respondents involved in the questionnaires, 72.2% know what trans fats are (in general), 26.9% immediately admitted that they do not know and do not know such a notion, and 0.9% do not know/I do not answer.

When respondents were asked to answer the question: How often do you eat processed foods that contain trans fats? The following answers were offered: Always; Often; Sometimes; Rarely; Not; I don't know/I don't answer. The results obtained are shown in Figure 3.

To the question: Which of the foods high in trans fats listed be-

**Table 1. Sociodemographic characteristics of respondents.**

VARIABLES	FREQUENCY	PERCENT
	(n = 1230)	
AGE GROUP (years)		
≤ 20	0	0
20-25	289	23.5
26-30	202	16.4
31-35	184	15.0
36-40	141	11.5
41-45	162	13.2
46-50	149	12.2
51-55	78	6.3
56-60	21	1.6
≥ 61	4	0.3
GENDER		
Male	588	47.8
Female	642	52.2
RELIGION		
Orthodox Christians	1223	99.4
Other religions	0	0
I do not answer	7	0.5

**Table 2. Body mass index and weight status in adults.**

BMI (kg/m <sup>2</sup> )	The state of weight	
<18,5	UW	Underweight
18,5 ... 24,9	NW	Normal weight
25 ... 29,9	OW	Overweight
30 ... 34,9	MO	Moderate obesity (grade I)
35 ... 39,9	O	Obesity (grade II)
> 40	MRO	Morbid obesity, advanced (grade III)

Table 3. Respondents distribution by nutritional status and sex.

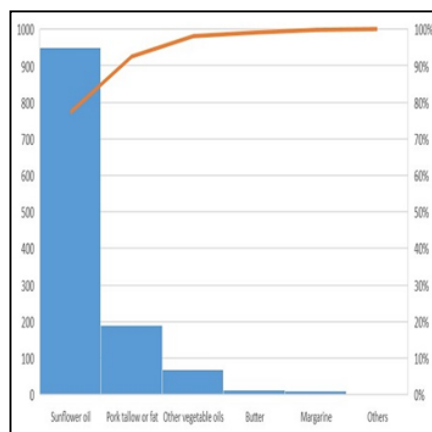
BMI	FREQUENCY (n = 1230)	PERCENT
UW1	84	6.8
Men	33	38.9
Women	51	61.1
NW2	501	40.7
Men	212	42.3
Women	289	57.7
OW3	465	37.8
Men	164	35.3
Women	301	64.7
O4	180	14.7
Men	49	27.23
Women	131	72.77

UW<sup>1</sup>-underweight; NW<sup>2</sup>-normal weight; OW<sup>3</sup>-overweight; O<sup>4</sup>-obesity

Figure 1. Countries with policies or regulations on industrially produced (artificial) TFAs. Data source: World Health Organization. [https://www.who.int/news/item/22-05-2019-five-billion-people-still-at-risk-from-industrial-trans-fat-exposure].



Figure 2. Oils and fats types that most commonly are used in household cooking.



low do you eat most often? Respondents mentioned (in descending order) the following products: Salty and sweet biscuits, cookies; chips, french fries, burgers, frozen dough - puff pastry or for pizza. The results obtained are shown in Figure 4.

Respondents' position on the exclusion of foods containing trans fats from the diet shows that 470 (38.2%) of respondents are likely to give up eating foods containing trans fats and more than a third 457(37.2%) say they can give up ease to this category of

products. The results obtained are shown in Figure 5.

**Strategic actions to ensure the rapid and complete elimination of trans fats produced from the food supply**

WHO recommends that the share of saturated fats in the diet should not exceed 7% of the number of calories consumed daily, and trans fats - no more than 1%. Given that one gram of fat provides approximately 9 calories, the following values express

Figure 3. Frequency of consumption of foods containing trans fats.

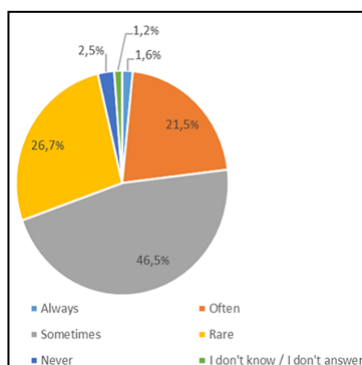


Figure 4. Frequency of consumption of trans fats depending on their source.

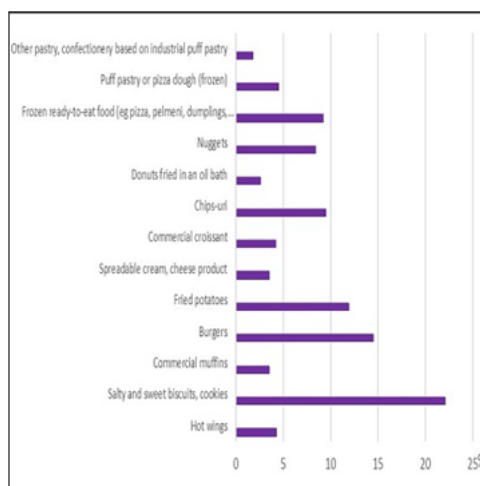


Figure 5. Assessing the possibility of excluding trans fats from the diet.

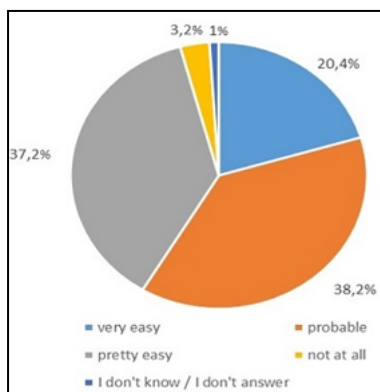


Table 4. The share of trans fats in the diet [20].

Total number of calories	1% of the total number of calories	Maximum trans fat limit
2 000	20	about 2 grams
1 500	15	about 1.5 grams
1 200	12	about 1 gram

the maximum recommended amount of trans fat, relative to the daily calorie intake the data presented in Table 4.

Excessive consumption of trans fats is a real threat to the health of the population, including the younger generation and that is really dangerous. On 15 May 2018, the World Health Organization (WHO) recommended the elimination of industrially produced trans fatty acids from foods consumed by people from different

countries, as regular consumption of trans artificial fats was associated with a 34% increase in the number of general deaths, 28% of them, being caused by heart disease, but also increased by 21% the risk of developing a heart disease.

Strategic actions to ensure the rapid and complete elimination of trans fats produced from the food supply:

- review the dietary sources of trans fats produced industrially and take care of the necessary policy change possibilities;
- promoting the replacement of trans fats produced industrially with healthier fats and oils;
- promoting regulatory actions to eliminate trans fats produced industrially;
- assessing and monitoring the content of trans fats in the food supply and changes in the consumption of trans fats in the population;
- awareness of the negative impact of trans fats on health among decision-makers, producers, suppliers and the public;
- ensuring compliance with policies and regulations.

Several high-income countries have virtually eliminated industrially-produced trans fats through legally imposed limits on the amount that can be contained in packaged food. Governments of some countries have implemented nationwide bans on partially hydrogenated oils, the main source of industrially-produced trans fats.

## Conclusions

The behavior of consumers in the Republic of Moldova for the consumption of foods containing trans fats was evaluated. The analysis of the survey results led to the implementation of measures and rules to improve nutrition, to minimize the incidence of diseases associated with excessive consumption of trans fats. Respondents were found to be aware of the potential risks and diseases caused by the consumption of high-fat processed foods, as well as the consumption of frozen dough intended for pastry and confectionery products; salty and sweet biscuits, cookies; french fries, chips and others are consumed in excess.

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