



Trans fatty acid elimination policy in member states of the Eurasian Economic Union: Implementation challenges and capacity for enforcement

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Abstract

Removing trans fatty acids (TFAs) from the food supply in the Eurasian Economic Union (EAEU) are one of the most effective public health interventions for reducing the risk of noncommunicable diseases. EAEU Member States have taken important steps to reduce TFA in oil and fat products to <2% of the total fat content. The authors summarize existing policies in the region, identify challenges in implementation, and suggest measures to strengthen regulation to achieve compliance with WHO guidelines. Documents published between 2011 and 2019 in Russian and English were reviewed, including EAEU and Member State restrictions on TFA in food products, data on TFA content in foods, and food labeling policies. The EAEU has established TFA limits in oil and fat products; however, Member States are currently not achieving the WHO guideline of <2% of total fat content in food products. A lack of harmonized monitoring systems and sanctions create challenges in monitoring compliance. The authors recommend developing an EAEU-wide monitoring system to test TFA content and organize population intake surveys. Discrepancies exist within regulatory frameworks that allow higher levels of TFAs in dairy products and infant formula. The authors recommend extending the current regulation to mandate TFA limits for all food products. Research found that strengthening regulation to meet the WHO guidelines should be prioritized. Member States should implement actions to replace TFAs with healthier fats, develop standardized surveillance methods, and scale-up strategic communication to ensure the food industry and the public follow public health recommendations to protect the health of the EAEU population.

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1 | INTRODUCTION

Industrially produced trans fatty acids (TFAs) remain a global killer and a significant contributor to noncommunicable diseases (NCDs). It is estimated that removing TFA from the food supply could prevent 500 000 coronary heart disease (CHD) deaths each year.¹ Consumption of TFA in the diet raises the risk of CHD as it increases low density lipoprotein levels, inflammatory markers and endothelial damage while decreasing high-density lipoprotein levels.² Removing TFA from the diet is known to be an effective intervention to reduce the risk of NCDs.

CHD is the primary cause of premature mortality globally. The highest rates of cardiovascular disease (CVD) mortality in the Eurasian Economic Union (EAEU) region are in Russia and Belarus for men, and Kyrgyzstan for women.³ In Kazakhstan, the mean TFA content for commonly available street foods was up to 144.3% of the recommended maximum daily intake.⁴ In the capital cities of Armenia and Kyrgyzstan, approximately 50% of the fat in foods were TFAs. These trends represent the high levels found elsewhere in the country and across the region.⁵

In 2018, the World Health Organization (WHO) published the REPLACE action package which provides a menu of evidence-informed policy actions to implement WHO guidelines of restricting TFA levels to less than 2% of total fat content in all food products. This tool was developed in line with evidence of what works to reduce TFA in achieving the goal of global elimination of TFA from the food supply by 2023. In 2004, Denmark mandated restrictions on TFA which resulted in a reduction of annual CHD mortality by 10.4%.⁶ The United States, Canada, and other countries in Europe have since implemented policies restricting TFA content in food.^{7,8}

In January 2018, Technical Regulation (TR) of the EAEU Customs Union (CU), TR CU 024/2011 "On Oil and Fat Products" (the Regulation), came into force after a seven-year transition period. The Regulation states that the permissible level of TFAs for a specific list of vegetable oil and animal fat products should not exceed 2% of the total fat content in the product. The Regulation also establishes packaging, labeling, and associated production process, storage, transportation, and sale requirements for oil and fat products released into circulation in EAEU Member States. Governments of the individual EAEU Member States are responsible for implementation, risk management, and communication of all EAEU regulations.

It is estimated that if WHO guidelines were fully implemented, the resulting reduction in the burden of TFA-related disease in EAEU Member States could have prevented up to over 26 000 deaths and up to 508 183 disability-adjusted life years (DALYs) in 2017.⁹ However, at country level, there are multiple discrepancies between TFA permissible limits in regulatory documents and challenges for policy implementation. Several policy options exist to reduce TFA intake. However, there has not yet been a detailed review on the extent of the adoption of WHO guidelines within the EAEU by the Regulation. This paper will summarize existing TFA policies in the EAEU region following adoption of the Regulation, identify challenges for implementation, and identify measures to expand the

Regulation to cover all food products. The aim is to ensure compliance with WHO guidelines and best practices for the elimination of TFA from the global food supply.

2 | METHODS

We performed a comprehensive review of documents relating to TFAs in Member States of the EAEU including Armenia, Belarus, Kazakhstan, Kyrgyzstan, and the Russian Federation. Online data sources included WHO documents, TRs on the TFA restrictions in the EAEU, Eurasian Economic Commission (EEC) statements, and Member State-specific information. Existing policies on TFAs, market and sales data, export and import data, TFA content in foods, food labeling laws, and dietary TFA intake and awareness among consumers in the EAEU were considered within the scope of the review. Data on TFA content in available foods were identified in the results of WHO surveys and in documentation collected from research institutions engaged in this topic including universities, federal research centers, Federal Service for Veterinary and Phytosanitary Surveillance (Rosselkhozadzor), experts of Solnechnye Produkty, industry experts, NGO Roscontrol, Russian Quality System (Roskachestvo), NGO Obshestvenny control. A qualitative methodology was employed to group documents and compare extracted data on national TFA content with the Regulation and WHO guidelines. Similarities and differences between the Regulation and other regulations which establish TFA limits, namely TR CU 021/2011 "On Food Product Safety", TR CU 022/2011 "On Food Product Labelling", and TR CU 033/2013 "On the Safety of Milk and Dairy Products" were evaluated.

Media reports and press-conferences were also included as the availability of published research articles related to the Regulations was limited. Food industry reports and resources from discussions with food officials and advocates were also evaluated.

Online search inclusion criteria were items published between 2011 and 2019 in the Russian or English language, documents examining TFA policy in the EAEU and EAEU Member states, and data relevant to TFAs, food, nutrition, health, policies, legislation, regulation, advertising, labeling, and taxation. Based on the inclusion criteria, documents not matching this were excluded.

Relevant documents were identified by searching Web sites of the EAEU, the Eurasian Economic Commission (EEC), EAEU Member States Governments, ministries, services and agencies, and research centers. The Web sites of the European Commission, European Union, Organization for Economic Co-operation and Development, United Nations (UN), WHO, FAO, and World Trade Organization were also searched for additional official publications. PubMed, eLibrary, the EBSCO online research databases, the JSTOR electronic library, and the Google Scholar web search engine were scrutinized for English and Russian language articles using the following keywords in various combinations: EAEU; Armenia; Belarus; Kazakhstan; Kyrgyzstan; Russian Federation; EEC; WHO; trans fats; trans fatty acids; industrially produced

TABLE 1 Data on TFA content in various foods in EAEU member states, 2016-2018, from WHO surveys, official sources and research centers

| City, product | Year, source | Food Source: TFA content |
|-------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Kyrgyz Republic | | |
| Bishkek, most commonly available foods from street food vendors | 2016, WHO FEEDCities project ¹ | Industrial wafers: 3.78 g (170.4%) Homemade manty (a boiled or steamed pasta-wrapped snack usually filled with a spicy meat mixture): 2.86 g (128.9%) Homemade samsa: 1.57 g (70.8%) Mean TFA content per average serving (% of recommended maximum daily intake of TFA on the basis of a reference daily intake of 2000 kcal for an average adult) |
| Republic of Kazakhstan | | |
| Almaty, most commonly available foods from street food vendors | 2017, WHO FEEDCities project ² | Homemade pirozhnoe: 3.20 g (144.3%) Industrial wafers: 1.98 g (96.1%) Homemade shashlik: 1.87 g (84.5%) Mean TFA content per average serving (% of recommended maximum daily intake of TFA (on the basis of a reference daily intake of 2000 kcal for an average adult) |
| Aktau, most commonly available foods from street food vendors | 2017, WHO FEEDCities project ² | Industrial wafers: 1.77 g (79.9%) Biscuits: 0.94 g (42.7%) Mean TFA content per average serving (% of recommended maximum daily intake of TFA on the basis of a reference daily intake of 2000 kcal for an average adult) |
| Kyzylorda, most commonly available foods from street food vendors | 2017, WHO FEEDCities project ² | Industrial wafers: 5.05 g (227.1%) Homemade donor kebab: 0.75 g (34%) Mean TFA content per average serving (% of recommended maximum daily intake of TFA on the basis of a reference daily intake of 2000 kcal for an average adult) |
| Almaty, packaged food from city supermarkets | 2016, Kazakh National Medical University ³ | Median proportion of TFAs of total fat content in <ul style="list-style-type: none"> • Wafers 8.0% • Chocolate bars and candies 16.95% • Cakes 12.33% • Sugary confectionery products 7.07% • Biscuits, wafer-chocolate cakes and glazed cakes 11.85% The average content of TFAs per 100 grams of product was 14.69 grams. The maximum and minimum content of TFAs in the samples was from 27.24 to 4.68 grams. |
| Russian Federation | | |
| Moscow, packaged food | 2017, PhD thesis research – Federal Scientific Centre for Food Systems named after V.M. Gorbатов ⁴ | Maximum amount of TFA of total fat content: <ul style="list-style-type: none"> • Fatty glazes: 32.8 to 35.5% • Chocolate glaze: 30% • Flour confectionery products, biscuits with fruit filling: 5% • Cookies: 10% |
| Falsification of milk products with vegetable oils | 2018 [July] Rosselkhoznadzor official presentation ⁵ | Up to 20-25% of milk products samples are falsified with vegetable oils that were not declared by manufacturer. Most often are falsified butter, curd cheese, condensed milk, and cheese. |
| Falsification of milk products with vegetable oils | 2018 [September] Research institute of fat replacers under Rosselkhoznadzor ⁶ | Methods of falsification of milk over the past 2-3 years have not changed, despite the January 1, 2018, regulation which prohibited TFA content above 2% of fat content. TFAs are found in substitutes of milk fat. |
| Oil and fat products | 2014, experts of Solnechnye Produkty holding ⁷ | Content of TFAs of total fat content in products: <ul style="list-style-type: none"> • Soft margarines: 0.1-17% • Frying margarines: 20-40% • Filling fats: 25-39% • Shortenings: 18-46% • Deep frying fats: 5-65% • Non-lauric fats—cocoa butter replacers: 50-55%. |
| Packaged food, supermarkets | 2017, NGO Roskachestvo ⁸ | Polyot Cookies: 4.1% TFA of total fat content. |

(Continues)

TABLE 1 (Continued)

| City, product | Year, source | Food Source: TFA content |
|----------------------------------------------------------------------|------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Moscow, packaged food from supermarkets | 2018 [October 30], NGOs Roscontrol - "Rostest-Moskva" ⁹ | In "Red October" factory candies: 22.2% TFA of total fat due to cocoa butter substitutes and milk fat substitutes which contain partially hydrogenated oils (PHO) |
| Saint-Petersburg, packaged food | 2018, Obshestvenny control", consumers NGO ¹⁰ | The Krestyanskoye spread (Alkond LLC): more than 10% TFA of total fat. |
| Republic of Belarus | | |
| Republic of Belarus, candies from three confectionery factories (CF) | 2016, tested at Kaunas University of Technology at a journalist initiative ¹¹ | Contents of TFAs of total fats in products of <ul style="list-style-type: none"> • "Spartak" Confectionery factory candies: "Arahisoviye TOP"—15.27%; • "Slodych" Confectionery factory cookies: "Skazochniy Slodych"—13.31%; • "Kommunarka" Confectionery factory: <ul style="list-style-type: none"> a. chocolates: "Grilyazh v shokolade"—10.55%; b. sweets: "Belarusian"—3.05%; c. candies: "Krasnaya Shapochka"—2.26%. |

Content of TFA found in available food products in each of the Member States of the EAEU collected by WHO surveys, official sources and research centers from 2016 to 2018. It is evident that there are multiple food products with TFA content that exceed WHO guidelines and best country practices. WHO = World Health Organization; TFA = trans fatty acids.

trans fats; trans-isomers of fatty acids; food; nutrition; market; production; export; import; food safety; food security; advertising; taxation; labeling; policies; consumption; health; availability; access; agriculture; noncommunicable diseases; cardiovascular disease; coronary heart disease; burden of disease; prevention; surveillance; public health.

3 | RESULTS

The EAEU and its Member States are currently not achieving the WHO guideline to restrict TFA content to less than 2% of total fat content in all food products. WHO guidelines limit TFA intake to no more than <1% of dietary energy from TFA per day. For each numbered point below, the authors address the Regulation, summarize to what extent the Regulation has been adopted across the region, outline the main challenges of implementation of the Regulation, and make recommendations to address these challenges based on policy measures from REPLACE action package and best country practices. The authors recommend these challenges be addressed promptly in order to best protect people living in the EAEU from the harms of TFA and achieve the WHO target of eliminating TFA from the global food supply by 2023. These recommendations apply to stakeholders involved in policy implementation and surveillance: (A) EAEU, (B) EEC and EAEU Member States, (C) private business, food industry, and retailers, (D) public health, nutrition experts, food industry experts, civil society and NGOs, and (E) mass media and consumers.

3.1 | Policy surveillance and sanctions

The Regulation mandates the permissible level of TFAs for a fixed list of oil and fat products to be limited to 2% of the total fat content.

Data on TFA content in various foods in EAEU Member States between 2016 and 2018 are summarized in Table 1. It is evident that many of the products available in the EAEU Member States have TFA levels that exceed the Regulation and WHO guideline limits. On April 5, 2012, the Plan of Implementation of the Regulation stated that authorized bodies of surveillance in each EAEU Member State are responsible for implementation of guidelines, monitoring compliance with requirements, and applying sanctions in case of non-compliance.¹⁰ These bodies are listed in Table S1.

The main challenge for policy surveillance is the lack of systematic and standardized surveys of TFA content in food products and population intake. The Member State authorized bodies for surveillance are composed of various sectors and their coordination is unknown. Authors recommended developing an EAEU-wide surveillance system to monitor compliance with the TFA restriction and strengthen coordination. Regular meetings between authorized bodies and publication of findings can further strengthen and harmonize surveillance. Laboratory capacity can be improved to enable accurate measurements of TFA content in all available foods to help guide TFA restriction.

Currently, there are Member State-specific sanctions for violations of the Regulation that apply to the local manufacturer, the foreign manufacturer of imported products, and to the seller. The sanctions of three EAEU Member States for releasing products into circulation that exceed the TFA permissible limit are listed in Table S2. These sanctions are not harmonized across the region and are not strongly supported by government advice or support of media coverage. It is recommended that these sanctions be more strongly enforced and supported by media coverage to encourage public advocacy and compliance. This could also be supported by maintaining a public database of manufacturers and reporting those that are not meeting the regulated limits. A summary of challenges and recommendations on policy surveillance and sanctions are found in Table 2.

TABLE 2 Challenges and recommendation on policy surveillance and sanction

| Challenges | Recommendations |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> There is no EAEU-wide monitoring system for TFA and SFA content in food or food consumption surveys. | <ul style="list-style-type: none"> Develop and maintain an EAEU-wide monitoring system for TFAs and SFAs in key food categories: (1) fats and oils available to both consumers and commercial producers, (2) packaged foods and their labels, and (3) street or restaurant foods. (A) Implement regular food consumption surveys and laboratory testing of TFA levels in key foods to estimate population intake of TFA. (A, B) Strengthen EAEU/EAEU Member States capacity to monitor composition of foods, implementation of and compliance with legal provisions. (A, B) |
| <ul style="list-style-type: none"> There is a lack of information on the implementation of the TFA restriction in EAEU/EAEU Member States in official publications and data bases. | <ul style="list-style-type: none"> Prepare and publish annual official reports on the implementation of the TFA restriction, assessment of opportunities and barriers to TFAs elimination, and the replacement of TFAs with healthier fats and oils in the EAEU. (A, B, C, D, E) Establish a publicly accessible database of: (1) TFAs and SFAs nutrient label data; (2) laboratory analyzed content for fats and oils available to both consumers and commercial producers, packaged foods, and street and restaurant foods; (3) products with either high TFAs and SFAs content or those with lower TFAs and SFAs content but are consumed in large quantities; (4) population intake or population sub-groups likely to have high exposure to TFAs and SFAs; and (5) a list of enterprises producing oil and fat with a high TFA level. (A, B, C, D, E) |
| <ul style="list-style-type: none"> The authorized bodies of EAEU Member States who are responsible for the implementation of surveillance over compliance of requirements on TFAs (Table S3) are composed of various sectors and their coordination is unknown. | <ul style="list-style-type: none"> Strengthen cooperation and coordination between the authorized bodies in EAEU Member States and establish annual reports to make generally and publicly available. (B, D) Organize regular meetings between the authorized bodies of EAEU Member States to harmonize enforcement surveillance TFAs restriction. (A, B, D) |
| <ul style="list-style-type: none"> There is no response from EAEU and EAEU Member States authorized bodies about the numerous products found with higher than permissible limits of TFA. There is no application of relevant legislated sanctions or other actions to protect consumers against the products. Sanctions for violation of TRs are not enforced. | <ul style="list-style-type: none"> Organize a standard procedure to discuss findings of TFA content in food tests performed by various agencies that exceed levels legislated by TRs and recommended by WHO. (B, C, D, E) Compile and publish information on the application of sanctions related to violation of TRs on TFAs in EAEU Member States along with recommendations and coverage in mass media. (A, B, C, D, E) Legislate effective, harmonized sanctions for violation of TRs on TFA and enforce the application of the sanctions to protect consumers in all EAEU Member States. (A, B) |
| <ul style="list-style-type: none"> There is no established knowledge-transfer mechanism for best practices related to the TFAs restriction within and between the retailers and producers in the food industry. | <ul style="list-style-type: none"> Organize a systematic transfer of best practices related to the TFAs restriction within and between retailers and producers in the food industry. (B, C, D) |
| <ul style="list-style-type: none"> There is no information available on efforts to harmonize approaches of EAEU Member States to implement the TFAs restriction, tests, or audits. | <ul style="list-style-type: none"> Announce efforts to harmonize approaches of EAEU Member States to implement of TFAs restriction, tests, and audits. (A, B) |

Challenges posed by the lack of policy surveillance in the EAUE Member States and recommendations based on policy measures from REPLACE action package and best country practices are presented. EAEU, Eurasian Economic Union; TFA, trans fatty acid; SFA, saturated fatty acid; TRs, technical regulations; WHO, World Health Organization; PHO, partially hydrogenated oils. Recommendations apply to (A) EAEU, (B) EEC and EAEU Member States, (C) private business, food industry, and retailers, (D) public health, nutrition experts, food industry experts, civil society and NGOs, and (E) mass media and consumers.

3.2 | Related technical regulations

Related TRs that establish restrictions on TFA content are TR CU 021/2011 “On Food Product Safety”, TR CU 022/2011 “On Food Product Labelling”, and TR CU 033/2013 “On the Safety of Milk and Dairy Products” displayed in Table S3.

There are discrepancies in the permissible levels of TFA between the different TRs that set TFA limits. According to “On the Safety of Milk and Dairy Products”, the TFA limit for milk replacers for feeding young children allows up to 3% of the total fat content. For products containing dairy, such as cream vegetable spreads, the permissible

TFA level is 8% of the total fat content. “On Food Product Safety” limits breast milk substitutes to no more than 4% and restricts the use of partially hydrogenated oils (PHOs) in baby food. “On Food Product Labelling” sets no requirement for the amounts of saturated fatty acids (SFAs), monounsaturated fatty acids (MUFAs), polyunsaturated fatty acids (PUFAs), and TFA on food labels, nor requires separation between SFA and TFA when labeling fats.

The authors recommended amending “On Food Product Labelling” to introduce separate labeling of TFA and SFA content in oil and fat products, dairy products, and food imported into the EAEU. The Regulation restricts hard-to-read font sizes and contrasting

TABLE 3 Challenges and recommendations for related TRs

| Challenges | Recommendations |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> The developing groups of the TRs are different, resulting in different levels. | <ul style="list-style-type: none"> Increase cooperation between the developing groups of TRs and mandate inclusion of experts in public health, nutrition, health care, and representatives of consumer protection organizations and NGOs to balance political and industrial interests in the EEC technical committee when drafting TRs. (A, B, C, D) |
| <ul style="list-style-type: none"> Limits of TFAs content in other TRs that mandate restriction on TFA do not have harmonized limits and do not cover all foods such as imported foods. | <ul style="list-style-type: none"> Legislate amendments across all TRs to limit TFAs content to 2% in all foods, including processed oils and fats, dairy products, foods for children, and foods imported in EAEU customs territory. (B) Restrict PHOs use based on WHO guidelines. (B) |
| <ul style="list-style-type: none"> Provisions on mandatory labeling of TFAs content in specific oil and fat products in the Regulation do not cover all foods or imported foods. | <ul style="list-style-type: none"> Legislate amendments in “On Food Product Labelling” to require separate labeling of TFAs and SFAs content in all foods. (B) Information should be included on the packaging, label, and leaflet placed in each packaging unit or attached to each packaging unit, using font ≥ 1.2 mm. (B) |
| <ul style="list-style-type: none"> There is no concept of fortification in “On the Safety of Milk and Dairy Products” or in administrative and criminal codes, nor is there a corresponding punishment.¹² Rosselkhozadzor findings show multiple dairy products falsified with hydrogenated oils. | <ul style="list-style-type: none"> Introduce the concept of falsified food products in EAEU law such as mandatory regulation of food product quality indicators, labeling requirements, mandatory certification of quality management systems at enterprises, ensuring compliance with HACCP principles, and expanding methodological frameworks for verifying authenticity of food products. (B, C, D) |

Challenges on the discrepancies between TRs and how to address these challenges are recommended based on policy measures from REPLACE action package and best country practices. TR, technical regulation; NGO, nongovernmental organization; EEC, Eurasian Economic Commission; TFA, trans fatty acid; EAEU, Eurasian Economic Union; PHO, partially hydrogenated oil; WHO, World Health Organization; HACCP, Hazard Analysis and Critical Control Point. Recommendations apply to (A) EAEU, (B) EEC and EAEU Member States, (C) private business, food industry, and retailers, (D) public health, nutrition experts, food industry experts, civil society, and NGOs, and (E) mass media and consumers.

backgrounds (Table S4), whereas “On Food Product Labelling” does not mandate the appearance of labels. To address this discrepancy, it is recommended to revise “On Food Product Labelling” to restrict hard-to-read font sizes and contrasting backgrounds.

The main challenge of “On the Safety of Milk and Dairy Products” is the combination of dairy and milk-containing products in one legal field. Hydrogenated fats and oils are often used in the manufacturing of dairy and milk products resulting in a significant increase in TFA content. Authors recommended introducing the concept of falsification in “On the Safety of Milk and Dairy Products” by including food quality indicators, labeling requirements, and expanding the methodological framework for verifying the authenticity of food products.

To address the discrepancy of permissible TFA limits between the TRs, authors recommended increasing cooperation between TR development groups and mandate inclusion of experts in public health, nutrition, and consumer protection organizations. This will balance political and industrial interests, ensure policy coherence, and align TFA limits to the WHO guidelines.

A summary of challenges and recommendations on related technical regulations are found in Table 3.

3.3 | Current level of policy implementation

The Regulation was enforced after a seven-year transition period, with previous permissible levels of 20% for solid margarines and

specialty fats, and 8% for vegetable oil and animal fat derived products. The Regulation states that by January 1, 2018, the TFA content for the specified list of oil and fat products were to have less than of 2% of the total fat content. However, governmental and industry bodies have raised concerns that the time allowance is not sufficient for adoption of this limit nationwide. (Table S5).

We recommend that the EEC provides support while facilitating conditions that are conducive to the development of advanced equipment, technologies, machinery, and revise TRs with recipes for reformulation. The EEC Plan of Measures should include tools to implement the Regulation and promote the import of healthy fats. Replacing TFAs with healthy fats and oils should be emphasized in all settings, including prisons, hospitals, and schools. A summary of challenges and recommendations on the current legal state and the replacement of TFAs are found in Table 4.

3.4 | Awareness of technical regulation

Awareness of the TFA regulation among policy makers, businesses, experts and consumers is currently low in the EAEU Member States. The EAEU and Member States should publicly commit to adopting TFA regulations, promoting TFA replacement, and enforcing TFA regulation. Public awareness of the importance of TFA elimination and the harmful effects of TFA on health is not widespread. Estimates on the economic burden of TFA consumptions needs to be adequately communicated to policy makers, the food industry,

TABLE 4 Challenges and recommendations for current level of policy implementation

| Challenges | Recommendations |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> Recommendations for the implementation of the Regulation in the EEC plan of measures are not available. | <ul style="list-style-type: none"> Review the EEC Plan of Measures and prepare recommendations for the implementation and application of the Regulation. (B) |
| <ul style="list-style-type: none"> Recommendations and requirements for food industries to replace TFAs with healthier fats, technologies and recipes for relevant reformulation are not included in the Regulation. | <ul style="list-style-type: none"> Include recommendations and requirements for food industries to replace TFAs with healthier fats, technologies and recipes for relevant reformulation in revision of the Regulation. (B, C, D) |
| <ul style="list-style-type: none"> Legal provisions on food rations in Russian federal prisons and small-scale food production in prisons allows the use of margarine. | <ul style="list-style-type: none"> Amend legal provisions on food rations for prisoners and small-scale food production in prisons to promote the replacement of TFAs with healthy fats in all EAEU Member States. (B) |
| <ul style="list-style-type: none"> Regulations on taxation, foreign trade, and international barter practices of all food products do not promote the replacement of TFAs with healthy PUFAs and MUFAs. | <ul style="list-style-type: none"> Amend regulations on taxation, foreign trade, and international barter practices of all food products to promote the replacement of TFAs with healthy fats. (B) Develop and approve trade policies to help expand market share for healthier fats and oils to avoid PHOs and oils high in SFAs. (B) Reduce or eliminate subsidies for PHOs and oils high in SFAs. (B) |
| <ul style="list-style-type: none"> The Executive director of Oil and Fat Union of Russia, Yuriy Morozov argues the standards do not correspond to the recommendations set forth in the Codex Alimentarius, and to postpone the regulation for five years. Ministry of National Economy of the Republic of Kazakhstan states that introducing new equipment and technologies incurs costs and proposed to postpone enforcement of the Regulation until 2023. (Table S5) | <ul style="list-style-type: none"> Provide support and facilitates conditions that are conducive to the development of advanced equipment, technologies, and machinery to process oilseeds and vegetable oils. (B) Expand and improve technical equipment and innovative technologies of oil processing enterprises. (B, C) Develop and implement alternative food production techniques and create innovative products with healthy oils and fats. (B, C, D) Provide small grants and technical assistance to modernized enterprises and innovation research to promote the replacement of TFAs with healthy oils and fats. (B) Ensure that the industries that have taken a lead on TFAs restriction are not commercially disadvantaged. (B, C) |
| <ul style="list-style-type: none"> Tropical oils are being used as a PHO replacement to preserve traditional production technologies. Tropical oils contain SFAs and are not environmentally sustainable. This has resulted in an increase of imported tropical oils. | <ul style="list-style-type: none"> Disseminate information and technologies on TFAs replacement alternatives that do not increase SFA intake and increase the use of environmentally sustainable oils and fats. (B, D, E) Develop recommendations and requirements for oils and fats food industries to replace TFAs with PUFAs and MUFAs and include technologies and recipes for relevant reformulation. (B, C, D) |
| <ul style="list-style-type: none"> Legal provisions on public purchasing in EAEU Member States do not specify need to replace TFAs with healthy oils and fats. | <ul style="list-style-type: none"> Amend legal provisions on public purchasing in EAEU Member States to specify need to replace TFAs with healthy oil and fats. (B) Subsidize the availability of products containing healthy fats and oils in public institutions including schools, hospitals, government offices, uniformed services, correctional institutions and in governmental programs that provide supplemental nutrition to women and children, preschool and school nutrition programs, and other programs. (B) |

This table identifies the challenges in the current level of policy implementation and the lack of recommendation to replace TFAs with healthier fats and oils. Recommendations were made based on policy measures from REPLACE action package and best country practices. TFA, trans fatty acid; EEC, Eurasian Economic Commission; EAEU, Eurasian Economic Union; PUFA, polyunsaturated fatty acid; MUFA, monounsaturated fatty acid; SFA, saturated fatty acid; CU, customs union; PHO, poly hydrogenated oils. Recommendations apply to (A) EAEU, (B) EEC and EAEU Member States, (C) private business, food industry, and retailers, (D) public health, nutrition experts, food industry experts, civil society and NGOs, and (E) mass media and consumers.

and other stakeholders. Awareness could be increased through a multi-faceted communication campaign through media publications, conferences, position papers, and reporting of compliance with the Regulation. Children are susceptible to advertising of food products high in TFAs. We recommend mandating restrictions on advertising of food high in TFA, SFA, added sugar and salt to children as a shorter-term steppingstone toward measures banning TFAs in food. Caterers and food outlets should be educated on the TFA restriction, how to limit TFA in foods without increasing SFAs, and the health benefits of replacing TFAs with healthy fats. Table 5 outlines challenges and recommendations of the TFA restriction awareness.

4 | DISCUSSION

The authors evaluated an EAEU regulation that set a maximum limit on the content of TFA permitted in the EAEU food supply and conducted a critical evaluation of the challenges and barriers to implementation. From this evaluation, a number of key recommendations were made based on the REPLACE action package and best practice guidelines. If implemented, these recommendations will expand existing regulations, strengthen monitoring and enforcement, and help Member States of the EAEU restrict TFA levels to 2% of the total fat content in food products.

TABLE 5 Challenges and recommendations of awareness of technical regulation

| Challenges | Recommendations |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> There is no official declaration of the burden of disease, economic losses, number of deaths, and DALYs caused by TFA intake in EAEU and EAEU Member States. | <ul style="list-style-type: none"> Increase awareness and knowledge of the burden of disease caused by TFA intake among policymakers, producers, suppliers, and the public in order to gain support for the development and implementation of regulatory actions to comply with the TFA restriction. (A, B, D) |
| <ul style="list-style-type: none"> There is no statistical research on health and economic benefits of the TFA restriction in EAEU and EAEU Member States. | <ul style="list-style-type: none"> Support and highlight statistical research on health and economic benefits of the TFAs restriction, mapping of relevant stakeholders, TFA levels in food, and TFA intake. (B, C, D, E) Develop and implement media strategies to encourage rapid actions by governments and industries. (B, C, D, E) |
| <ul style="list-style-type: none"> There is a lack of organized discussion of enforcement of the TFA restriction in EAEU and EAEU Member States covered in professional and mass media, involving EEC, private businesses, food industry, retailers, public health, nutrition experts, food industry experts, civil society and NGOs, mass media, and the general public. | <ul style="list-style-type: none"> Organize a discussion of enforcement of the TFA restriction in EAEU and EAEU Member States covered in professional and mass media, involving all stakeholders. (A, B, C, D, E) Establish a coalition of stakeholders on the TFAs restriction that meet regularly and organize conferences, position papers, media publications, and large-scale public awareness such as Day of Healthy Nutrition or Nutrition Month. (A, B, C, D, E) |
| <ul style="list-style-type: none"> Public awareness on the TFAs restriction is not adequate: only 40% of respondents avoid products containing TFAs. | <ul style="list-style-type: none"> Monitor and increase public awareness on the TFA restriction. (B, C, D, E) Promote resources that will allow the population to obtain reliable information about food products, including identification of falsified and poor-quality products. (B, C, D, E) |
| <ul style="list-style-type: none"> There is a lack of large-scale health education on the harmful effects of TFA intake and recommendations on how to avoid TFA intake that involves government, medical, scientific, public organizations, and the mass media. | <ul style="list-style-type: none"> Organize a multi-faceted communication campaign covering the harmful effects of TFAs intake on health that involves government, medical, scientific, public organizations, and the mass media that recommends on how to avoid TFAs intake. (B, C, D, E) |
| <ul style="list-style-type: none"> The need to replace TFAs with healthier fats and oils is not included in professional and public discussions in EAEU Member States; only limiting level of TFAs content is available. | <ul style="list-style-type: none"> Emphasize the need to replace TFAs with healthier fats and oils by developing and adopting evidence-based recommendations for replacement of oil and fats that contain TFAs, with healthier PUFAs or MUFAs according to WHO guidelines. (C, D, E) Develop, approve, and apply in practice TFAs replacement kit for food companies. (C, D) |
| <ul style="list-style-type: none"> Advertising of products with high content of SFAs, TFAs, added sugar or salt, to children in their schools and in Internet is not banned by the Regulation. | <ul style="list-style-type: none"> Ban advertising of products with high content of SFAs, TFAs, added sugar and salt, to children in their schools and in Internet as a short-term steppingstone to restricting TFAs. (B) |
| <ul style="list-style-type: none"> There are no EAEU or EAEU Member States programs on TFAs restriction, or single terminology on TFAs challenge in EAEU. | <ul style="list-style-type: none"> Prepare, adopt, and implement EAEU and EAEU Member States programs on the TFAs restriction to help introduce single terminology for use in the EAEU according to WHO and international best practice. (A, B, C, D, E) |
| <ul style="list-style-type: none"> There is a lack of training of staff of food industries on the TFAs restriction. | <ul style="list-style-type: none"> Conduct a targeted food and oil manufacturer and staff of food industry education campaign on TFA restriction, how to limit TFAs in foods without increasing SFAs, the health benefits of TFAs restriction, and on how to comply with current regulations. (A, B, C, D) |
| <ul style="list-style-type: none"> There is low priority placed on promoting the TFA restriction in existing and drafted programs on NCDs, food security, and nutrition. | <ul style="list-style-type: none"> Promote the TFA restriction in existing and drafted programs on NCDs, food security, and nutrition with high priority. (A, B, C, D) |
| <ul style="list-style-type: none"> There is a lack of commitment of EAEU and EAEU Member States to the TFAs restriction. | <ul style="list-style-type: none"> EAEU and EAEU Member States should publicly commit to TFA restriction, highlighting the current TFA intake level, negative health effects of TFAs, how to identify TFAs on labels, and how to choose products containing healthier oils and fats. (A, B) Required industry actions to reformulate food products in order to support sustainable implementation of regulatory actions. (A, B, C) |
| <ul style="list-style-type: none"> Oil and fat food industries are not transparent to the final consumer regarding their production, technologies, and recipes used in accordance with the legal provisions on TFA restriction. | <ul style="list-style-type: none"> Oil and fat food industries should become transparent to the final consumer regarding their production, technologies, and recipes used in accordance with the legal provisions on TFA restriction. (C, E) |

(Continues)

TABLE 5 (Continued)

Lack of awareness poses challenges in implementation of the Regulation. Recommendations based on policy measures from REPLACE action package and best country practices are suggested to address these challenges. TFA, trans fatty acid; EAEU, Eurasian Economic Union; DALY, disability-adjusted life year; WHO, World Health Organization; EEC, Eurasian Economic Commission; NGO, nongovernmental organization; NCD, noncommunicable disease; PUFA, polyunsaturated fatty acid; MUFA, monounsaturated fatty acid; SFA, saturated fatty acid. Recommendations apply to (A) EAEU, (B) EEC, and EAEU Member States, (C) private business, food industry, and retailers, (D) public health, nutrition experts, food industry experts, civil society, and NGOs, and (E) mass media and consumers.

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There are discrepancies between the different EAEU regulatory documents which establish limits on TFA content of foods. Some of the limits are much higher than the recommended maximum of 2% of total fat content, such as in dairy products (8%), infant formula (4%), and milk-based baby food products (3%). No distinction is made between processed and unprocessed dairy products that contain only naturally occurring TFA. Meeting WHO guidelines and limiting the permissible TFA limit to 2% of total fat in all foods is potentially one of the most effective public health interventions for reducing NCD risks within the 176 million EAEU population. TFA reduction by mandatory regulation is listed in the WHO Best Buys document as an effective intervention with a cost-effective analysis of <\$100 per DALY averted in low- and middle-income countries.¹¹ Alignment of the varied regulations with the WHO guideline will provide policy coherence and reduce the known adverse health impacts of TFA consumption.

Currently, the Regulation lacks recommendations and requirements to replace TFAs with healthier fats. Replacing 1% energy of TFA with MUFA or PUFA decreases the total cholesterol/high-density lipoprotein cholesterol ratio by 0.54 and 0.67, respectively, which are associated with a lower risk of CHD.¹² Revision of TRs to include oil and fat labeling requirements are likely to demonstrate health benefits similar to countries across the globe that have adopted WHO guidelines. Labeling would make further regulation easier in the EAEU by incentivizing industries to reformulate recipes and meet TFA limits. For example, Canada adopted mandatory labeling regulations, which was

directly associated with a 30% reduction in population TFA intake¹³ and a 35% reduction in breastmilk TFA content.¹⁴ In the United States, TFA labeling was associated with a 58% decrease in blood plasma TFA levels.¹⁵

Data from WHO surveys, official sources, research centers, and NGOs suggest persistently high TFA levels in popular food products in the EAEU. There is potential for an EAEU-wide surveillance system to be established in monitoring food composition and population intake. Workshops to help build laboratory capacity and technology, such as national laboratory training workshops organized by WHO, will be essential in improving surveillance and enable stronger enforcement of the Regulation.¹⁶ Although it may be costly, this effort is necessary to facilitate the implementation of TFA restrictions the EAEU.

This paper is the first review on the challenges in implementation of the Regulation in the EAEU, introducing recommendations on how to improve and expand TFA restriction policies in line with WHO guidelines and best practice policies. Strengths of the study include extensive searches across multiple platforms in both the Russian and English languages. There are also several limitations. Public policy research is a difficult area to study as there are multiple and complex factors that shape and influence policy implementation. This may have led to audiences or stakeholders left out of recommendations, or the omission of documents despite the review of diverse range of materials from difference sources. This format also relied on the judgment of experts to decide on the information to include in the review.

5 | CONCLUSION

As part of the UN Sustainable Development Goal 3.4, the global community has committed to reducing premature death from NCDs by one third by 2030. Our research found that existing regulations in the EAEU need to be expanded and implementation harmonized. Going forward, there are opportunities for EAEU Member States to work together to implement effective actions to replace TFAs with healthier fats, develop standardized surveillance methods, and scale-up strategic communication to ensure food industries and consumers follow public health recommendations. Full implementation of the TRs and WHO recommendations is achievable and expected to have a significant impact on public health in the EAEU.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.

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