



FEEDcities project

The food environment
in cities in eastern Europe and
central Asia – Ukraine

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central Asia – Ukraine

Abstract

This technical report presents results from a cross-sectional study conducted in Lviv, Ukraine, between October and November 2023, as part of the FEEDcities project – Food environment description in cities in eastern Europe and central Asia. It aimed to assess the content of trans-fatty acids, sodium and potassium in a selection of foods commonly available for sale in this setting. The nutritional composition of selected industrial and homemade foods available in kiosks, fast-food outlets and supermarkets is presented, and the policy implications of the results are discussed.

Keywords

FAST FOODS
FOOD ANALYSIS
UKRAINE
POTASSIUM
SODIUM
TRANS FATTY ACIDS

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Abbreviations

ERC	Research Ethics Review Committee
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MoH	Ministry of Health of Ukraine
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NCD	noncommunicable disease
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RTE	ready to eat
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TFA	trans-fatty acid
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Executive summary

The main objective of the FEEDcities project is to characterize the street food environment in cities in eastern Europe and central Asia. This study is an extension of the original FEEDcities framework, aiming to better assist in the monitoring of the content of specific nutrients in foods. The FEEDcities project in Ukraine had a modified objective of surveying the prevalence of trans–fatty acids (TFA) in an expanded sample of foods, to provide the government with baseline data on TFA prevalence following the introduction of comprehensive legislation to eliminate TFA from the food supply chain enacted in October 2023. The data collected on TFA levels in the surveyed foods could also be communicated to the population to support healthier food choices. An additional objective of the project in Ukraine was to monitor the sodium and potassium content of the foods, in line with global noncommunicable disease (NCD) control and prevention targets to reduce blood pressure and the risk of cardiovascular disease, as well as population salt intake by 30% by 2025.

This report provides an overview of the nutritional composition of homemade and industrial foods commonly available in urban Lviv, Ukraine, based on a standardized methodology. Specifically, this report describes the contents of TFA, sodium and potassium in selected foods from kiosks, fast–food outlets and supermarkets.

Between October and November 2023, a cross–sectional study was conducted in Lviv, comprising three steps:

- **Step 1:** identification of nutrients to target and food items;
- **Step 2:** definition of the food collection strategy, including pre–selection of vending sites, compilation of data on foods available, selection and collection of foods, and processing of samples; and
- **Step 3:** chemical analysis of food samples.

In step 1, TFA was identified as the primary nutrient of focus, alongside sodium and potassium. A list of food items with potentially high or unknown TFA and sodium content was created with input from nutrition and public health experts.

In step 2, a list of food items was created and refined based on information collected through direct observation by field researchers. Eligible vending sites for collecting data and samples for the study were determined based on observed distribution patterns across the city. Approximately 80% of kiosks and fast–food outlets were located in the city’s “downtown” area. Therefore, a 500 m radius centred on the Danylo Halytskyi monument was drawn and all vending sites identified within the zone were mapped. Data on foods available was collected by direct observation of a total of 61 vending sites that were randomly sampled within predefined strata, comprising a total of 37 kiosks, 20 fast–food outlets and four large supermarkets (including one of each of the main chains identified).

After data collection and a final reassessment of the foods available, a total of 39 food categories were identified to be collected: 14 homemade and 25 industrial foods.

The food collection strategy was defined based on the geographical distribution and data on foods available at different vending sites, and random sampling procedures. Homemade foods were collected in kiosks and fast–food outlets; between two and eight samples of each food category were collected. Industrial foods were collected in supermarkets, where the most common brands/subtypes available were identified. Depending on the variability of products, for the same food category, between two and four samples of the most common brands/subtypes were collected (for food categories presenting higher variability of subtypes and brands, a higher number of samples was collected).

In step 3, a total of 120 samples were prepared for chemical analysis (60 homemade foods and 60 industrial foods). The chemical analysis included the determination of total fat and fatty acids including TFA, and sodium and potassium.

High TFA content was found in both homemade and industrial foods. The mean TFA content per serving was highest in industrial margarine (2.27 g), milk–based desserts (1.93 g), homemade sweet pastries (0.82 g), homemade

panini (0.70 g) and homemade falafel (0.66 g). Of the 120 food samples analysed, approximately one third (n=35) did not comply with the new national regulation, which limits TFA to less than 2 g per 100 g of total fat. This limit was exceeded by a total of five homemade food categories (mean TFA/100 g of fat – sweet pastries: 7.45 g; panini: 3.84 g; savoury pastries: 3.26 g; pizza: 2.62 g; cake: 2.19 g) and eight industrial food categories (mean TFA/100 g of fat – milk-based desserts: 14.10 g; margarine: 10.07 g; frozen croissants: 9.68 g; hard cheese: 4.09 g; frozen *syrenky*: 3.61 g; ice cream: 3.09 g; cheese product/cheese spread: 3.06 g).

The highest sodium contents per serving were found in homemade foods, while industrial products were the ones with the highest values per 100 g. The highest mean sodium contents per serving were observed in homemade shawarma (2732 mg), hot dogs (2221 mg) and falafel (1709 mg) – corresponding to 136.6%, 111.0% and 85.4%, respectively, of the WHO recommended maximum daily intake of sodium (which is no more than 2000 mg of sodium each day, or about 5 g of salt). These results demonstrate that foods high in TFA and sodium can be easily found in the urban food environment of Lviv, whether they are homemade or industrially produced.

The mean potassium content per serving was highest in homemade fried potatoes (837 mg), falafel (876 mg) and shawarma (913 mg), which corresponded to 23.8%, 24.9% and 26.0%, respectively, of the recommended minimum daily intake for potassium. Regarding sodium-to-potassium ratio, the highest mean values were found in industrial mayonnaise (74.9), frozen pies (18.5) and processed meat (16.7), and the lowest in industrial chocolate (0.3), *prianyky* (0.5) and butter (0.7).

The data provided in this report highlight the importance of implementing and reinforcing strategies to promote healthier food environments to protect population health.

WHO provides a range of recommendations and strategies to promote better nutrition and address NCDs, in line with the *Global action plan for the prevention and control of noncommunicable diseases 2013–2020*¹ and NCD “best buys”, with 88 cost effective policy interventions and policy options. Under objective 3 of the action plan, “to reduce modifiable risk factors for noncommunicable disease and underlying social determinants through creation of health-promoting environments”, the most effective and recommended interventions are focused on creating healthier food environments, by addressing factors that influence food choices and dietary habits. These include: product reformulation to reduce the content of harmful nutrients such as sodium, saturated fats and sugars; food labelling to provide clear and accurate information to help consumers make accurate choices; health promotion and nutrition education to increase public knowledge around healthy eating; and eliminating industrial trans-fats through the development of legislation to ban their use in the food chain, among others. These recommended actions were partially integrated within the National Action Plan for Non-Communicable Disease Prevention, Control and Health Promotion in Ukraine.

This study was conducted amid the humanitarian crisis following the Russian Federation invasion of Ukraine in February 2022. Despite these challenges, the FEEDcities project offers crucial insights into improving food nutrition in Lviv, which is essential for addressing diet-related NCDs locally and globally.

1 Global action plan for the prevention and control of noncommunicable diseases 2013–2020. Geneva: World Health Organization; 2013 (<https://iris.who.int/handle/10665/94384>, accessed 24 June 2025).



1. Introduction

Ukraine is a lower middle-income country located in eastern Europe, with an annual gross domestic product of US\$ 199.8 billion in 2021 (1). Prior to the full-scale invasion by the Russian Federation in February 2022, the total population was approximately 38 million people, of which 70% lived in urban areas (2). Prior to the invasion, the country experienced a slight decline in the population over the years (between –0.2% and –1.1%) from 1994, which deepened in 2022 to –14.3% (2). Around 17.9% of the population is under the age of 18 years, and 17.6% is aged 65 years or over (3). Life expectancy at birth is estimated at 70 years (data from 2021) (2).

Noncommunicable diseases (NCDs) were estimated to account for 91% of all-cause mortality in the country, with cardiovascular disease being the leading cause of death (63%), followed by cancer (15%) (data from 2018) (4). In 2019, more than half (59.1%) of the adult population lived with overweight (men: 57.9%; women: 60.2%), of which nearly a quarter (24.8%) was living with obesity (men: 20.1%; women: 29.8%) (5). Regarding childhood and adolescence, 18.1% of girls and 24.2% of boys were overweight, and 4.7% of girls and 8.9% of boys had obesity (6).

Compared with the recommended targets determined by the EAT–Lancet Commission on healthy diets from sustainable food systems, in 2018 low intakes of fruit (47% of recommendations), vegetables (61%), legumes (9%), nuts (51%) and whole grains (54%) were observed, whereas the intake levels were above recommended values for dairy products (216%), red meat (278%) and fish (113%) (6). According to recent data from the WHO STEPwise approach to NCD risk factor surveillance in Ukraine, two thirds of the population (66.4%) did not consume a sufficient quantity of fruits and vegetables, 28.3% drank sugar-sweetened soft drinks more than once a week, and overall, 32.8% of the population had three to five risk factors for developing cardiovascular disease, mostly raised blood pressure, which was observed in just over a third of the population (34.8%) (5).

Closely linked to the urbanization, globalization and industrialization of food systems in recent decades, eastern European countries have gone through a set of dietary changes essentially characterized by a decrease in consumption of staple foods rich in fibre, together with an increasing intake of processed and ultra-processed foods, more likely to be energy-dense and high in fats, sugar and salt (7). This nutrition transition has been associated with a growing incidence of diet-related NCDs. Sodium and trans-fatty acids (TFA) in particular have been conclusively linked to an increased risk of cardiovascular diseases (8,9).

WHO has set targets to prevent and control NCDs by 2025, including a 30% relative reduction in mean population intake of salt/sodium (9,10). WHO recommends limiting the sodium intake to < 2 g/day (equivalent to 5 g of salt) to decrease blood pressure and reduce the risk of cardiovascular disease, stroke and coronary heart disease in adults (11). In Ukraine, although sodium restriction policies are in place (12), this level is still exceeded more than twice over (12.6 g/day) (5). In addition, the WHO recommended potassium intake should be at least 3510 mg/day. However, it was estimated that only 20.5% of Ukrainians met this WHO-recommended level (5).

WHO also set a global target to eliminate TFA from the food supply by the end of 2023. By the end of 2025, WHO calls for best-practice policies in countries that together account for at least 90% of the total global TFA burden and at least 70% of the total TFA burden within each region (9,13). Ukraine has made efforts to eliminate industrially produced trans-fats from its food supply. The Ministry of Health of Ukraine (MoH) Order No. 1613, limits industrially produced TFA contents to a maximum of 2 g per 100 g of total fat (14). Although this regulation has been in place since October 2023, the national monitoring programmes have not yet been implemented due limited resources, lack of capacity among national laboratories and an absence of monitoring frameworks. WHO has been providing vital support to Ukraine by enhancing laboratory capacities in selected regions, including Kyiv city and Khmelnytskyi region. The implementation of the FEEDcities research project in the country has also laid the groundwork for establishing national monitoring efforts on the way to zero-trans-fat status.

Food environment in Lviv, Ukraine

Lviv is the largest city in western Ukraine, with an estimated population of 717 273 in 2022 (15). It is subdivided into six administrative units: Frankivskiy, Halytskyi, Lychakivskiy, Shevchenkivskiy, Sykhivskiy and Zaliznychniy districts. Located about 80 km from the border with Poland, throughout history this city's cuisine has been influenced by different cultures, while still leaning on local traditions. Prior to the war in Ukraine, Lviv was one of the most visited cities in eastern Europe, attracting tourists not only with its history and architecture, but also remarkable food culture.

This urban food environment is characterized by the coexistence of a wide diversity of food options, available in food markets, cafes, restaurants and other establishments. In line with other eastern European urban settings (16,17,18), traditional local dishes are readily available, such as *varenyky* [dumplings] and *pyrizhky* [pastries]; however, the abundance of westernized food options (e.g. pizza, burgers, croissants, panini) reflects the ongoing globalization of the food supply chain. As in other urban food environments of the region, in urban Ukraine, there has been a clear evolution from a mostly informal food context to one in which the consumer is exposed to both informal and formal scenarios. In the city's Central Market, located in Halytskyi district, the gastronomic offer is especially diverse due to the concentration of different establishments with diverse food concepts. Kiosks typically offer traditional Ukrainian street food (e.g. *syrynyky* [cheese pancake]), while also providing other popular foods (e.g. hot dogs, kebabs). Unlike kiosks, which maintain a much more traditional footprint, fast-food outlets provide the population with westernized, globally known food options, such as burgers and fries. Both these establishments are widely available, strategically placed in convenient locations, offering quick and affordable meals to locals and tourists.

Supermarkets, particularly those from multinational chains, are widely available in this city. These food outlets have been transitioning over the years, seeking to meet the needs and preferences of the modern consumer. They provide a myriad of options, not limited to essential household goods, from fresh local ingredients to highly industrialized foods from international brands. Frozen pre-cooked foods are an example of very popular items due to their convenience for customers with little time to cook at home.

Since February 2022, Ukraine has been impacted by the full-scale military invasion by the Russian Federation, with major social and political implications. This context of prolonged emergency is having consequences on the food supply, which impacts the country's food environments, particularly regarding food availability. Therefore, the results obtained from this research should be interpreted in light of the current challenges of the Ukrainian food market.



2. Objective

The aim of this study was to assess the content of TFA, sodium and potassium in a selection of foods commonly available in kiosks, fast-food outlets and supermarkets in Lviv, Ukraine.

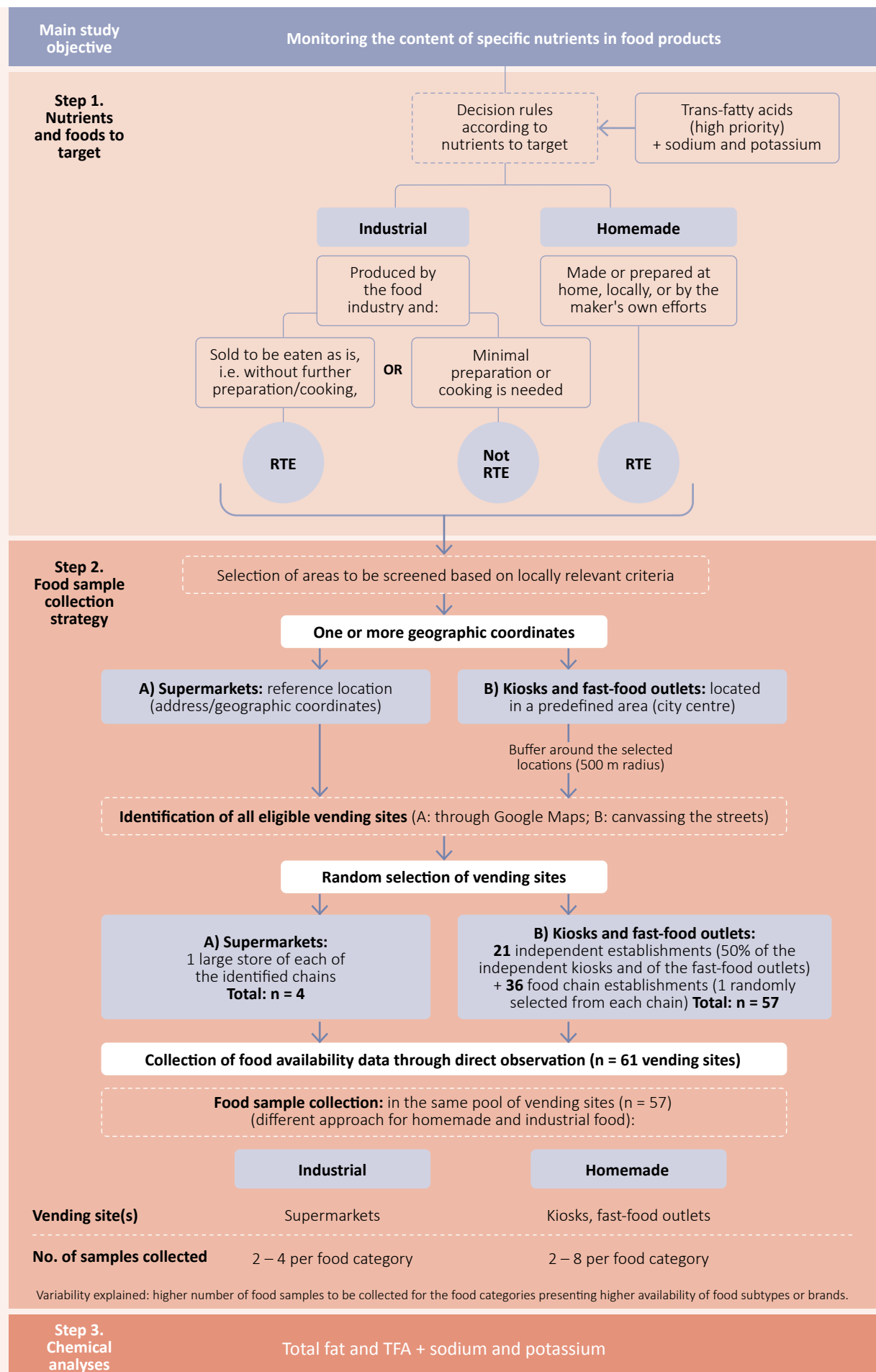
3. Methods

The FEEDcities project (19) aims to characterize the urban food environment of cities in eastern Europe and central Asia. It uses a stepwise methodology to assess different dimensions of these urban food environments: food availability, the nutritional composition of the most commonly available foods, and food purchasing and marketing strategies. As endorsed by the WHO Regional Office for Europe (20), it has the potential to support policy-making, especially in monitoring risk factors for the development of NCDs, through the assessment of levels of nutrients in foods (e.g. TFA, sodium, sugars) (21). This specific study was based on an extension of the FEEDcities protocol for monitoring the content of specific nutrients in foods (22). The original FEEDcities study was approved by the Ethics Committee of the Institute of Public Health of the University of Porto, Portugal. For the extension of the FEEDcities protocol for monitoring the content of specific nutrients in foods to be applied in Ukraine, the WHO Country Office in Ukraine consulted the WHO Research Ethics Review Committee (ERC) Secretariat on 3 October 2024. The ERC Secretariat stated that the project did not require submission to the ERC as the research did not engage with human participants and the only information collected and registered refers to the food offer. Data on the foods available for sale at different selling points was obtained by direct observation. The food samples for chemical analysis were bought by researchers as part of a regular transaction.

This cross-sectional study was conducted in October and November 2023 in Lviv, Ukraine. The study was implemented by a consortium made up of the non-profit organization Advocacy Centre “LIFE”, the Lviv Region Centre for Diseases Control and Prevention of the MoH, and two government laboratories – Khmelnytskyi Regional State Laboratory of the State Service of Ukraine for Food Safety and Consumer Protection, and the State Research Institute for Laboratory Diagnostics and Veterinary and Sanitary Expertise. The Regional Office provided overall guidance while the Country Office coordinated the consultant recruitment and training of local field researchers for data collection, and conducting of chemical analysis. Training sessions on data collection were held over a three-day period in an online format and aimed to prepare the field research team with all the knowledge and skills necessary for the key phases of project implementation. The project also had a complementary goal of building the capacity of national stakeholders to perform monitoring and enforcement measures in the future, based on the received skills and knowledge.

A flowchart summarizing the FEEDcities study methodology in Lviv is presented in Fig. 1.

Fig. 1. Flowchart of the FEEDcities study implementation in Lviv, Ukraine (2024)



Notes: RTE = ready-to-eat; TFA = trans-fatty acids

Source: authors

Step 1. Identification of nutrients to target and food items to select

TFA, sodium and potassium were selected as the nutrients to assess. TFA was selected due to the global targets to eliminate TFA and the recent order of the MoH to limit TFA in foods (in compliance with European Commission Regulation 2019/649 on the elimination of trans-fats from foods (23)). Sodium was selected as it has been recognized as key to assessing compliance with the aim of reducing population salt intake by 2025 (10), and potassium to support the recommendation to increase potassium intake (24) – to help reduce blood pressure and the risk of cardiovascular disease. In order to effectively inform policy development in these areas, data is needed to understand the current levels of these nutrients in the food supply.

This study aimed to collect both industrial (ready to eat (RTE) and not RTE) and homemade food items. These were defined as follows:

- **homemade food:** made or prepared at home, locally or by the maker's own efforts
- **industrial food:** produced by the food industry and:
 - **RTE:** sold to be eaten as is (i.e. without further preparation and/or cooking) or
 - **not RTE:** minimal preparation or cooking is needed for consumption.

A comprehensive list of food categories of interest was produced by a panel of Ukrainian experts in nutrition and public health and then reviewed and discussed with the FEEDcities research team. This list included categories of foods with expected high or unknown contents of TFA (higher priority) and sodium (lower priority). Although potassium was also quantified, due to its positive contribution to blood pressure regulation, it was not considered a priority when identifying the foods to be studied.

Step 2. Food sample collection strategy

Data collection through direct observation was performed by field researchers at the beginning of this step, and comprised the use of a previously defined list of food categories as a “checklist” to identify the most commonly available food items in each category (including brands and subtypes). The aim was to specifically determine the subtypes of food items from each category to be collected and the brands to be included.

Selection of vending sites

For the purpose of this study, eligible vending sites were considered to be the following types of establishments operating in a predefined perimeter:

- a) establishments selling RTE food, including beverages and/or snacks, from any venue other than a permanent storefront business or an establishment with four permanent walls, that does not sell directly on the street. This definition accounts for two types of actors selling food: food vendors, who often operate in more flexible (and particularly, but not only, informal) settings, focusing on RTE or specialized items; and retailers, who operate in more formal, fixed locations with a wider range of products, including fresh produce, packaged goods and RTE foods.
- b) supermarkets: large self-service retail stores that sell a wide variety of food products, including items requiring minimal preparation or cooking.

Data was collected from eligible vending sites, which included kiosks, fast-food outlets and supermarkets. For kiosks and fast-food outlets, the study area was defined as a 500 m radius centred around the Danylo Halytskyi monument in downtown Lviv. A total of 95 vending sites were mapped (name/brand, type of vending site, address and geographical coordinates) inside the zone, including both independent establishments, and kiosk and fast-food chains.

From the total vending sites mapped, a total of 57 kiosks and fast-food outlets were randomly selected for data collection on availability of homemade foods:

- **21 independent establishments:**
 - 7 (50%) independent fast-food outlets
 - 14 (50%) independent kiosks
- **36 outlets of food chains (one randomly selected from each chain):**
 - 23 outlets of kiosk chains
 - 19 outlets of kiosk chains with one establishment each in the zone
 - 3 outlets of kiosk chains with two establishments each in the zone
 - 1 outlet of a kiosk chain with four establishments in the zone
 - 13 outlets of fast-food chains
 - 6 outlets of fast-food chains with one establishment each in the zone
 - 4 outlets of fast-food chains with two establishments each in the zone
 - 2 outlets of fast-food chains with three establishments each in the zone
 - 1 outlet of a fast-food chain with four establishments in the zone.

Four supermarket chains were identified, with establishments varying in size (supermarkets and hypermarkets). One hypermarket of each chain was randomly selected for data collection on availability of industrial foods.

Compilation of data on foods available and their selection

For each vending site, location (administrative unit and geographic coordinates) and type (kiosk, fast-food outlet or supermarket) were recorded. In addition, the preliminary list of food items was used by the field researchers as a checklist to identify the food items available in each vending site, respective subtypes (e.g. for the food item “burgers”, the subtypes “burgers”, “cheeseburgers”, “chicken burgers” and “fish burgers” were identified) and brands (industrial food). Also, for each item of a different type/subtype and brand, serving size (in grams or millilitres), price (in local currency – hryvnia) and a photograph (if feasible) were collected.

Finally, all the gathered information was analysed, to make the final list of food categories: 14 for homemade and 25 for industrial foods (15 RTE and 10 not RTE) (Table 1). For each food category, a variable number of food samples were collected, according to the sampling strategy described below.

Table 1. Final list of food categories selected for chemical analysis

Industrial foods		Homemade foods
Ready to eat	Not ready to eat	
Biscuit sandwiches with cream or filling	Butter	Burgers
Cake	Cheese product (cheese spread)	Cakes
Chips	Frozen pies	Chicken nuggets
Chocolate/chocolate bars /chocolate candies	Frozen croissant	Croissants
Cookies (shortbread)	Frozen <i>syrynyky</i>	Deep-fried cheese
Croutons	Hard cheese	<i>Lyulya</i> kebab
<i>Keksy</i> (muffins)	Margarine	Falafel
Donuts	Mayonnaise	French fries
Gingerbread (with or without filling)	Processed cheese	Hot dogs
Ice cream	Processed meat	Crepes
Milk-based desserts	—	Panini (sandwich)
Non-chocolate candies	—	Pizza
Oatmeal cookies	—	Savoury pastries
Salty sticks	—	Sweet pastries
Wafers	—	—

Source: authors

Food collection strategy

The sampling strategy differed for homemade and industrial foods. Industrial foods were expected to show a higher variability between different brands and a lower variability within a specific brand. Therefore, the samples were purchased from a small number of vending sites, and the diversity of brands of each product was considered. On the other hand, homemade foods were expected to present a highly variable composition across vending sites. In this case, samples of the same food category were collected from a higher number of different vending sites, in order to capture that variability.

Sampling strategy for industrial foods

Industrial foods were collected only in supermarkets, since these vending sites provided a greater availability and diversity of brands and subtypes of foods. The most common brands and subtypes available in each of the four selected supermarkets were identified for each industrial food listed in the previous step. Then, between two and four samples of the most frequently available brands/subtypes were collected, depending on the variability of products within each category:

- categories with < 40 products: two samples collected
- categories with ≥ 40 and < 100 products: three samples collected
- categories with ≥ 100 products: four samples collected.

The supermarket where each sample was collected was randomly selected from the ones where that food was available.

Sampling strategy for homemade foods

Homemade foods were collected from kiosks and fast-food outlets. For each homemade food included on the final list of food categories selected for analysis, all places selling that food were recorded, and a pre-defined number of vending sites were randomly selected, depending on the number of samples to collect. Between two and eight samples of each food category were collected, depending on the variability of subtypes encountered within each food category. For example, within the category “chicken nuggets”, two samples were collected since there were no subtypes, whereas for “cake”, eight samples were collected to cover a high variability (e.g. tiramisu, chocolate cake, cheesecake). If the vending site did not sell the food items selected for collection, the next geographically closest vending site was used to collect the data.

A total of 120 samples were collected, 60 homemade foods and 60 industrial foods. Examples of samples collected for each food category are shown in Annex 1 (industrial foods) and Annex 2 (homemade foods). Food sample collection took place between 30 October and 8 November 2023.

Step 3. Sample preparation and chemical analyses

Each sample was photographed and weighed. All samples, solid and semi-solid, were mechanically ground, homogenized and separated into four aliquots. The aliquots were stored in individually labelled rigid plastic containers with covers and inside closed plastic bags. After preparation, each container was stored in a freezer (at -18°C) until chemical analysis. Samples were then defrosted, homogenized and analysed immediately.

All samples were analysed in duplicate (the analytical results are presented as the mean of the two determinations). Those values were expressed in grams per 100 g of fresh food, and then further computed into grams per serving, using harmonized portion sizes. Individual fatty acid results, including total TFA, were also expressed in grams per 100 g of total fatty acids.

For TFA analysis, the fat was extracted using organic solvents, then converted to fatty acid methyl esters and separated by gas chromatography, as described in the WHO Simplified Protocol (25). Sodium and potassium analyses were performed using an inductively coupled plasma optical emission spectrometer, after acid digestion in a closed-vessel microwave system, as described by Nascimento et al. (2014) (26).

Analyses were conducted in the Khmelnytskyi Regional State Laboratory of the State Service of Ukraine for Food Safety and Consumer Protection and in the State Research Institute for Laboratory Diagnostics and Veterinary and Sanitary Expertise.

Statistical analysis

Descriptive statistics were used to characterize this food environment. The selected vending sites were mapped, and their food availability was described using absolute and relative frequencies.

The nutritional composition of each food was presented as the mean and range of total fat (g) TFA (g), sodium (mg) and potassium (mg), both per serving and per 100 grams of food, as well as sodium-to-potassium molar ratio. The mean contribution to the daily recommended intake of each nutrient was also computed. For TFA, contents were also calculated in grams per 100 g of total fat, to compare with recent legislation limiting TFA to < 2 g/100 g total fat. Mean serving sizes were calculated as the mean of the individual portions collected for each food sample.

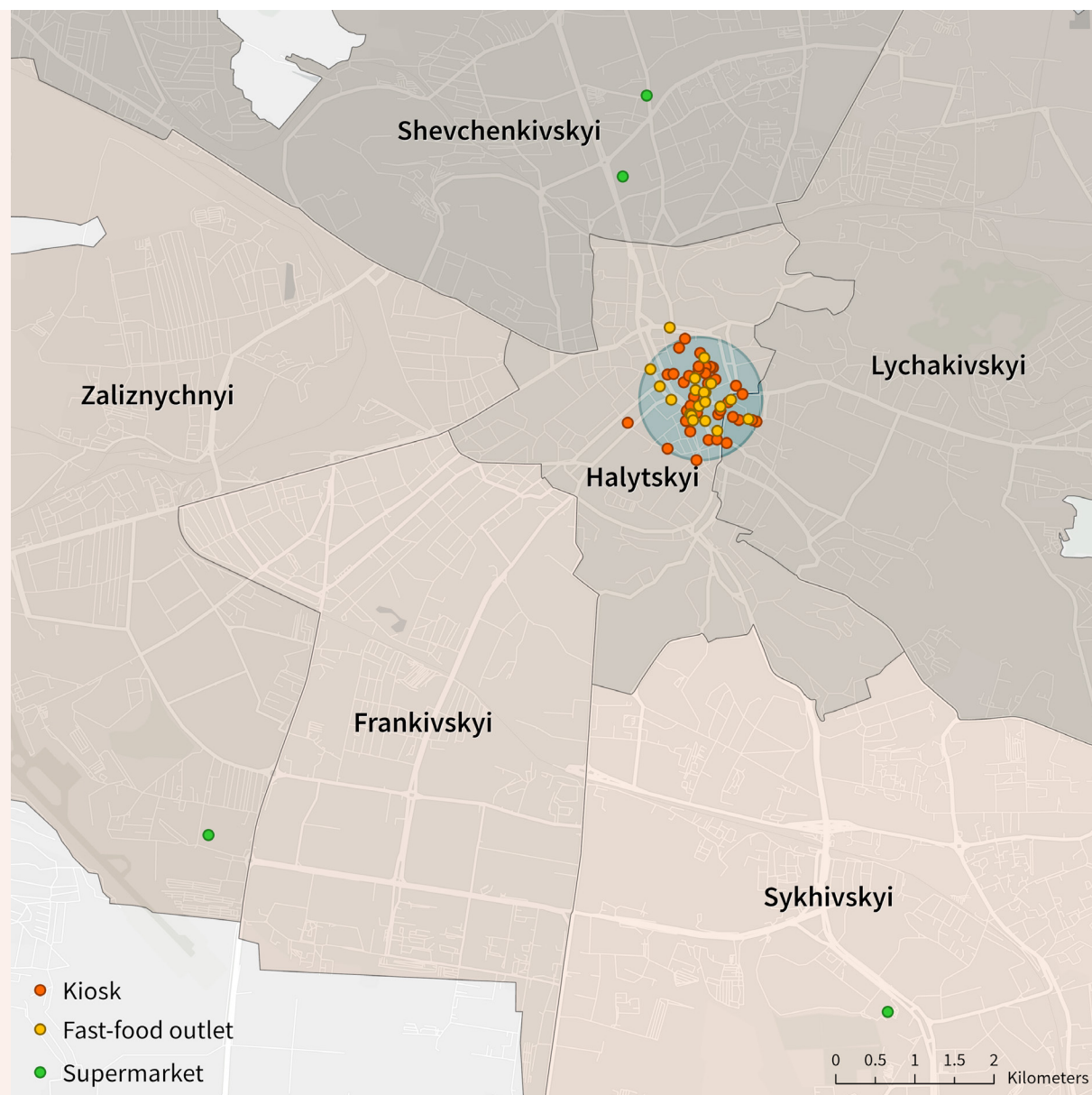


4. Results

Mapping of vending sites and food availability

Kiosks and fast-food outlets were most available in the city centre, although supermarkets were more concentrated in peripheral areas of the city (**Fig. 2**).

Fig. 2. Randomly selected vending sites to assess food availability and collect food samples, Lviv, Ukraine



Source: authors

The availability of homemade foods was assessed in 57 vending sites (20 kiosks; 37 fast-food outlets). From the 14 homemade foods selected, the most frequently available were sweet baked foods such as sweet pastries and cakes, available respectively in 50.9% and 43.9% of kiosks and fast-food outlets. Panini were also among the most frequently available homemade foods (38.6%). In contrast, snacks such as chicken nuggets, deep-fried cheese and falafel were the least frequently available, in 17.5%, 12.3% and 5.3% of the kiosks and fast-food outlets. Sweet baked foods (sweet pastries, cakes, croissants and crepes), panini and pizza were more often available in kiosks, while burgers, hot dogs, French fries, shawarma/kebab and snacks (chicken nuggets, deep-fried cheese and falafel) were more often available in fast-food outlets (Table 2).

Table 2. Availability of homemade food categories, by type of vending site

Homemade food categories	Total (n = 57)	Type of vending site	
		Fast-food outlet (n = 20)	Kiosk (n = 37)
	%	%	%
Sweet pastries	50.9	25.0	64.9
Cake	43.9	15.0	59.5
Panini (sandwich)	38.6	25.0	45.9
Savoury pastries	29.8	5.0	43.2
French fries	29.8	65.0	10.8
Burgers	24.6	40.0	16.2
Croissants	22.8	10.0	29.7
Shawarma/kebab	21.1	50.0	5.4
Pizza	19.3	10.0	24.3
Hot dogs	19.3	25.0	16.2
Chicken nuggets	17.5	45.0	2.7
Deep-fried cheese	12.3	25.0	5.4
Crepes	8.8	0.0	13.5
Falafel	5.3	15.0	0.0

Nutritional composition of the foods collected

A wide range of foods was analysed, including both local and westernized fast foods, sweet and savoury pastries, snacks and main dishes, as well as both RTE and not-RTE industrial products. The contents of TFA, sodium and potassium varied markedly across the foods analysed (Table 3)

The mean highest TFA content per serving was found in industrial margarine (mean: 2.27 g; range: 0.02–4.53 g), milk-based desserts (mean: 1.93 g; range: 0.23–3.63 g), homemade sweet pastries (mean: 0.82 g; range: 0.00–4.51 g), homemade panini (mean: 0.70 g; range: 0.08–2.49 g) and homemade falafel (mean: 0.66 g; range: 0.07–1.25 g), which corresponded to 102.4%, 86.8%, 36.8%, 31.3% and 29.6%, respectively, of the recommended maximum daily intake of TFA (based on a reference daily intake of 2000 kcal for an average adult). In contrast, some foods provided, on average, virtually zero grams of TFA (<0.001 g/serving), namely homemade fried potatoes and chicken nuggets, and industrial croutons, muffins and *prianyky*. The highest mean TFA content per 100 g of food was found in industrial margarine (5.69 g), milk-based desserts (0.96 g), homemade sweet pastries (0.52 g) and industrial frozen croissants (0.50 g) (Table 3).

Comparing collected data with the recent MoH Order No. 1613 (14), which limits TFA to 2 g per 100 g of total fat, a total of 13 food categories (out of 39) exceeded that limit – five homemade (mean TFA/100 g of fat – sweet pastries: 7.45 g; panini: 3.84 g; savoury pastries: 3.26 g; pizza: 2.62 g; cake: 2.19 g) and eight industrial (mean TFA/100 g of fat – milk-based desserts: 14.10 g; margarine: 10.07 g; frozen croissants: 9.68 g; hard cheese: 4.09 g; frozen *syrynky*: 3.61 g; ice cream: 3.09 g; cheese product/cheese spread: 3.06 g). Considering the total number of food samples analysed (n=120), approximately one third (n=35) show TFA values above the limit of 2 g per 100 g of total fat. Detailed results regarding total fat, monounsaturated fat, polyunsaturated fat and TFA are presented in Table 3 and Table A3.1 (Annex 3).

The highest sodium contents per serving were observed in homemade shawarma (mean: 2732 mg; range: 1870–3586 mg), hot dogs (mean: 2221 mg; range: 1631–2763 mg) and falafel (mean: 1709 mg; range: 1692–1725 mg),

corresponding to 136.6%, 111.0% and 85.4%, respectively, of the recommended maximum daily intake of sodium. The lowest sodium contents per serving were observed in industrial butter product/spread (mean: 7 mg; range: 6–8 mg), frozen *syrnyky* (mean: 31 mg; range: 28–34 mg), margarine (mean: 42 mg; range: 32–53 mg) and cake (mean: 44 mg; range: 18–80 mg), corresponding to 0.4%, 1.6%, 2.1% and 2.2%, respectively, of the recommended maximum daily intake of sodium. Considering 100 g of food, mean sodium contents were the highest in processed meat (1647 mg), frozen pies (1616 mg) and chips (1376 mg) and the lowest in butter product/spread (18 mg), *prianyky* [spice cookie] (60 mg) and frozen *syrnyky* (68 mg) (Table 4).

The potassium content per serving was highest in homemade fried potatoes (mean: 837 mg; range: 495–1547 mg), falafel (mean: 876 mg; range: 829–923 mg) and shawarma (mean: 913 mg; range: 792–1154 mg), which corresponded to 23.8%, 24.9% and 26.0%, respectively, of the recommended minimum daily intake for potassium. The mean potassium content per serving was lowest in industrial mayonnaise (4 mg), margarine (7 mg) and butter product/spread (20 mg), corresponding to 0.1%, 0.2% and 0.6%, respectively, of the recommended minimum daily intake for potassium. Considering 100 g of food, mean potassium contents were highest in industrial chocolate (616 mg), homemade fried potatoes (688 mg) and industrial chips (793 mg), and lowest in industrial mayonnaise (9 mg), margarine (18 mg) and butter product/spread (50 mg). Regarding sodium-to-potassium ratio, the highest mean values were found in industrial processed meat (16.7), frozen pies (18.5) and mayonnaise (74.9), and the lowest in industrial chocolate (0.3), *prianyky* (0.5) and butter product/spread (0.7). Detailed results for sodium, potassium and sodium-to-potassium ratio are presented in Table 4.

Data on the prices of the foods collected are presented in Table A3.2 (Annex 3).

Table 3. Nutritional composition of the food samples collected in Lviv (total fat and TFA)

		Mean serving size (min–max)		Total fat Mean (min–max)				TFA Mean (min–max)					
	n	g		g/serving		g/100 g		g/serving		g/100 g		g/100 g fat	
Homemade													
Burgers	4	180	(97–270)	10.3	(4.6–16.0)	5.9	(3.7–8.8)	0.03	(0.00–0.10)	0.03	(0.00–0.11)	0.55	(0.00–2.21)
Cake	8	171	(74–350)	26.4	(11.8–63.7)	14.6	(9.3–18.8)	0.49	(0.11–0.88)	0.33	(0.10–0.91)	2.19	(0.94–5.75)
Chicken nuggets	2	152	(104–200)	18.5	(13.1–24.0)	12.3	(12.0–12.5)	0.00	(0.00–0.00)	0.00	(0.00–0.00)	0.00	(0.00–0.00)
Croissants	4	87	(66–102)	19.1	(13.9–22.1)	22.0	(21.0–24.3)	0.34	(0.21–0.41)	0.38	(0.32–0.43)	1.75	(1.52–2.01)
Deep-fried cheese	2	100	(79–122)	15.9	(11.5–20.3)	15.7	(14.6–16.7)	0.06	(0.00–0.12)	0.05	(0.00–0.10)	0.29	(0.00–0.58)
Falafel	2	398	(345–450)	55.7	(52.7–58.7)	14.4	(11.7–17.0)	0.66	(0.07–1.25)	0.19	(0.01–0.36)	1.13	(0.12–2.13)
Fried potatoes	4	118	(83–200)	12.0	(6.3–19.4)	10.5	(6.3–15.0)	0.00	(0.00–0.01)	0.00	(0.00–0.01)	0.03	(0.00–0.11)
Hot dogs	4	324	(175–440)	19.7	(9.6–26.8)	6.0	(5.5–6.8)	0.20	(0.00–0.37)	0.06	(0.00–0.11)	1.00	(0.00–1.90)
Crepes	4	181	(80–260)	15.0	(5.0–22.1)	8.1	(6.2–9.8)	0.11	(0.00–0.31)	0.06	(0.00–0.13)	0.81	(0.00–1.60)
Panini	6	135	(75–223)	13.5	(5.2–25.2)	10.1	(3.6–17.0)	0.70	(0.08–2.49)	0.43	(0.07–1.12)	3.84	(0.78–9.89)
Pizza	4	168	(125–240)	9.6	(5.8–15.6)	5.7	(4.6–6.8)	0.35	(0.02–1.10)	0.16	(0.01–0.46)	2.62	(0.18–7.04)
Savoury pastries	6	120	(97–143)	12.9	(5.2–18.1)	10.5	(5.4–14.3)	0.33	(0.11–0.68)	0.28	(0.09–0.62)	3.26	(0.66–8.49)
Lyulya kebab	4	424	(380–450)	48.3	(38.8–70.6)	11.5	(9.0–17.0)	0.39	(0.00–1.04)	0.10	(0.00–0.27)	0.87	(0.00–2.69)
Sweet pastries	6	72	(18–175)	5.3	(1.1–16.1)	9.2	(2.0–20.9)	0.82	(0.00–4.51)	0.52	(0.00–2.58)	7.45	(0.00–8.01)

		Mean serving size (min–max)		Total fat Mean (min–max)				TFA Mean (min–max)					
	n	g		g/serving		g/100 g		g/serving		g/100 g		g/100 g fat	
Industrial													
Oatmeal cookies	2	78	(66–90)	9.7	(8.6–10.8)	12.5	(12.0–13.0)	0.13	(0.04–0.23)	0.19	(0.04–0.35)	1.51	(0.36–2.66)
Biscuits (sandwich with filling)	4	61	(45–87)	10.7	(2.7–16.8)	16.3	(6.1–23.4)	0.00	(0.00–0.01)	0.01	(0.00–0.01)	0.05	(0.00–0.09)
Biscuits (short-bread)	3	35	(21–52)	4.5	(1.9–6.5)	12.4	(9.1–15.4)	0.01	(0.00–0.02)	0.03	(0.00–0.07)	0.19	(0.04–0.45)
Butter product/spread	2	40	(40–40)	20.1	(12.3–27.9)	50.2	(30.8–69.7)	0.05	(0.03–0.06)	0.11	(0.08–0.15)	0.23	(0.21–0.26)
Cake	3	57	(45–75)	7.9	(3.7–12.5)	13.2	(8.3–16.6)	0.18	(0.02–0.42)	0.27	(0.05–0.56)	2.09	(0.33–3.35)
Candies (non-chocolate)	2	53	(45–62)	6.7	(0.8–12.6)	14.6	(1.4–27.9)	0.01	(0.00–0.01)	0.02	(0.01–0.03)	0.34	(0.11–0.57)
Cheese product/spread	2	40	(40–40)	6.6	(4.4–8.8)	16.5	(11.0–22.0)	0.17	(0.15–0.20)	0.43	(0.36–0.49)	3.06	(1.65–4.47)
Chips	2	75	(75–75)	25.5	(25.4–25.7)	34.1	(33.9–34.2)	0.01	(0.01–0.02)	0.02	(0.01–0.03)	0.05	(0.03–0.08)
Chocolate	4	55	(45–73)	17.6	(10.0–23.9)	32.1	(22.2–44.4)	0.02	(0.00–0.03)	0.03	(0.00–0.06)	0.10	(0.00–0.16)
Croutons	2	64	(63–65)	12.0	(10.0–14.0)	6.0	(5.0–7.0)	0.00	(0.00–0.00)	0.00	(0.00–0.00)	0.01	(0.00–0.02)
Desserts (milk-based)	2	300	(200–200)	11.9	(4.1–19.8)	18.5	(6.6–30.4)	1.93	(0.23–3.63)	0.96	(0.12–1.81)	14.10	(2.31–25.89)
Frozen croissants	2	50	(30–70)	4.4	(1.5–7.4)	7.8	(5.1–10.5)	0.16	(0.02–0.29)	0.50	(0.03–0.97)	9.68	(0.31–19.04)
Frozen pies	2	44	(44–44)	5.9	(5.4–6.5)	13.6	(12.3–14.8)	0.12	(0.00–0.24)	0.28	(0.01–0.56)	1.91	(0.06–3.77)
Frozen syrnky	2	46	(42–50)	1.6	(1.5–1.7)	3.5	(3.0–4.0)	0.06	(0.05–0.06)	0.13	(0.11–0.15)	3.61	(3.51–3.72)
Hard cheese	2	40	(40–40)	5.0	(1.2–8.8)	12.5	(3.0–22.0)	0.16	(0.06–0.25)	0.39	(0.16–0.61)	4.09	(2.79–5.39)
Ice cream	2	90	(80–100)	17.5	(15.0–20.0)	20.0	(15.0–25.0)	0.46	(0.00–0.93)	0.46	(0.00–0.93)	3.09	(0.00–6.19)
Keksy (muffins)	2	80	(60–100)	15.8	(9.9–21.7)	19.1	(16.5–21.7)	0.00	(0.00–0.00)	0.00	(0.00–0.01)	0.02	(0.00–0.04)
Margarine	2	40	(40–40)	22.5	(22.4–22.6)	56.2	(56.0–56.5)	2.27	(0.02–4.53)	5.69	(0.06–11.31)	10.07	(0.11–20.03)
Mayon-naise	2	40	(40–40)	18.1	(14.2–22.0)	45.4	(35.6–55.1)	0.00	(0.00–0.01)	0.01	(0.00–0.02)	0.02	(0.00–0.05)
Processed cheese	3	40	(40–40)	6.5	(5.9–7.3)	16.2	(14.7–18.3)	0.11	(0.01–0.18)	0.28	(0.03–0.45)	1.82	(0.16–2.89)
Processed meat	4	45	(40–48)	6.3	(4.2–9.4)	13.9	(10.4–20.6)	0.06	(0.01–0.12)	0.14	(0.02–0.26)	1.20	(0.08–2.33)
Prianyky	2	90	(68–111)	5.3	(3.4–7.2)	6.8	(3.1–10.5)	0.00	(0.00–0.00)	0.00	(0.00–0.01)	0.02	(0.00–0.05)
Salty sticks	2	40	(40–40)	2.2	(2.0–2.5)	5.6	(4.9–6.2)	0.01	(0.00–0.01)	0.02	(0.01–0.03)	0.37	(0.11–0.63)
Sweet donuts	2	73	(65–80)	10.1	(4.3–15.9)	15.0	(5.4–24.5)	0.09	(0.01–0.16)	0.13	(0.01–0.25)	0.63	(0.24–1.02)
Wafers	3	53	(50–55)	10.7	(7.4–12.8)	20.2	(14.8–23.5)	0.01	(0.00–0.01)	0.02	(0.01–0.02)	0.08	(0.07–0.11)

Source: authors

Table 4. Nutritional composition of the food samples collected in Lviv (sodium, potassium and sodium-to-potassium ratio)

		Mean serving size (min–max)		Sodium Mean (min–max)				Potassium Mean (min–max)				Sodium-to- potassium ratio Mean (min–max)	
	n	g		mg/100 g		mg/serving		mg/100 g		mg/serving			
Homemade													
Burgers	4	180	(97–270)	599	(560–640)	1059	(619–1512)	189	(30–348)	271	(80–345)	11.4	(3.1–31.9)
Cake	8	171	(74–350)	142	(60–324)	256	(56–778)	122	(83–209)	230	(80–730)	2.2	(0.5–5.0)
Chicken nuggets	2	152	(104–200)	540	(448–632)	866	(468–1264)	296	(233–359)	480	(244–717)	3.1	(3.0–3.3)
Croissants	4	87	66–102)	400	(304–492)	344	(251–410)	200	(104–393)	180	(85–402)	4.8	(1.3–8.0)
Deep-fried cheese	2	100	(79–122)	600	(540–660)	588	(520–656)	129	(111–146)	133	(88–178)	8.1	(6.3–10.0)
Falafel	2	398	(345–450)	438	(376–500)	1709	(1692–1725)	223	(205–240)	876	(829–923)	3.3	(3.1–3.5)
Fried potatoes	4	118	(83–200)	487	(184–832)	479	(340–693)	688	(571–789)	837	(495–1547)	1.3	(0.4–2.3)
Hot dogs	4	324	(175–440)	720	(628–932)	2221	(1631–2763)	192	(178–204)	624	(334–898)	6.4	(5.2–8.3)
Crepes	4	181	(80–260)	214	(40–504)	428	(60–1184)	198	(125–351)	391	(136–912)	2.4	(0.5–6.8)
Panini	6	135	(75–223)	625	(352–864)	794	(441–1253)	201	(123–348)	246	(188–310)	5.5	(3.4–8.3)
Pizza	4	168	(125–240)	570	(420–780)	949	(525–1411)	194	(127–336)	312	(164–437)	5.4	(3.9–6.6)
Savoury pastries	6	120	(97–143)	532	(328–700)	646	(391–998)	173	(143–214)	207	(167–256)	5.4	(2.6–7.0)
Shawarma/kebab	4	424	(380–450)	643	(492–864)	2732	(1870–3586)	215	(176–256)	913	(792–1154)	5.1	(3.9–6.8)
Sweet pastries	6	72	(18–175)	145	(48–316)	108	(9–358)	150	(93–199)	88	(28–172)	1.7	(0.4–3.5)
Industrial													
Oatmeal cookies	2	78	(66–90)	200	(200–200)	156	(132–180)	142	(131–153)	110	(101–118)	2.4	(2.2–2.6)
Biscuits (sandwich with filling)	4	61	(45–87)	110	(80–160)	67	(36–108)	296	(159–469)	176	(72–212)	0.7	(0.4–0.9)
Biscuits (short-bread)	3	35	(21–52)	293	(200–400)	93	(84–104)	172	(148–195)	63	(31–101)	3.0	(1.7–4.6)
Butter product/spread	2	40	(40–40)	18	(16–20)	7	(6–8)	50	(49–51)	20	(20–20)	0.6	(0.6–0.7)
Cake	3	57	(45–75)	81	(40–160)	44	(18–80)	206	(79–393)	114	(36–197)	0.7	(0.5–0.9)
Candies (non-chocolate)	2	53	(45–62)	130	(76–184)	65	(47–83)	222	(139–306)	112	(86–138)	1.0	(0.9–1.0)

		Mean serving size (min–max)		Sodium Mean (min–max)				Potassium Mean (min–max)				Sodium-to- potassium ratio Mean (min–max)	
	n	g		mg/100 g		mg/serving		mg/100 g		mg/serving			
Cheese product/ spread	2	40	(40–40)	494	(348–640)	198	(139–256)	189	(115–263)	76	(46–105)	5.8	(2.2–9.4)
Chips	2	75	(75–75)	1376	(992–1760)	1032	(744–1320)	793	(606–981)	595	(455–735)	3.3	(1.7–4.9)
Chocolate	4	55	(45–73)	101	(36–160)	51	(26–72)	616	(507–730)	334	(228–411)	0.3	(0.1–0.5)
Croutons	2	64	(63–65)	1040	(760–1320)	660	(494–825)	267	(235–300)	171	(147–195)	6.9	(4.3–9.5)
Desserts (milk–based)	2	300	(200–200)	74	(68–80)	148	(136–160)	145	(121–169)	290	(242–338)	0.9	(0.7–1.1)
Frozen croissants	2	50	(30–70)	160	(80–240)	96	(24–168)	99	(99–100)	50	(30–70)	2.7	(1.4–4.1)
Frozen pies	2	44	(44–44)	1616	(404–2828)	707	(177–1237)	134	(112–155)	59	(49–68)	18.5	(6.1–30.9)
Frozen <i>syrnyky</i>	2	46	(42–50)	68	(68–68)	31	(28–34)	103	(80–126)	46	(40–52)	1.2	(0.9–1.4)
Hard cheese	2	40	(40–40)	714	(520–908)	286	(208–363)	166	(74–257)	66	(30–103)	12.1	(3.4–20.8)
Ice cream	2	90	(80–100)	92	(92–92)	83	(74–92)	144	(142–146)	130	(114–146)	1.1	(1.1–1.1)
<i>Keksy</i> (muffins)	2	80	(60–100)	160	(160–160)	128	(96–160)	318	(296–340)	259	(178–340)	0.9	(0.8–0.9)
Margarine	2	40	(40–40)	106	(80–132)	42	(32–53)	18	(8–27)	7	(3–11)	12.4	(8.2–16.6)
Mayon- naise	2	40	(40–40)	400	(360–440)	160	(144–176)	9	(8–11)	4	(3–4)	74.9	(54.9–94.9)
Processed cheese	3	40	(40–40)	412	(284–604)	165	(114–242)	264	(221–336)	106	(88–134)	2.8	(1.4–4.4)
Processed meat	4	45	(40–48)	1647	(1332–2220)	749	(579–1055)	196	(103–311)	86	(49–124)	16.7	(7.9–26.1)
<i>Prianyky</i>	2	90	(68–111)	60	(40–80)	49	(44–54)	208	(137–278)	171	(153–190)	0.5	(0.5–0.5)
Salty sticks	2	40	(40–40)	900	(640–1160)	360	(256–464)	194	(187–201)	78	(75–80)	8.0	(5.4–10.5)
Sweet donuts	2	73	(65–80)	220	(160–280)	155	(128–182)	172	(123–221)	121	(98–143)	2.2	(2.2–2.2)
Wafers	3	53	(50–55)	160	(120–200)	83	(65–100)	257	(172–369)	133	(94–184)	1.1	(0.9–1.2)

Note: WHO recommendations: sodium: < 2000 mg/day (11); potassium: ≥ 3510 mg/day (24)
Source: authors



5. Conclusions and policy implications

This report provides an overview of the nutritional composition of selected homemade and industrial foods in Lviv, one of the largest cities of Ukraine, using a standardized methodology. This urban food environment is characterized by the coexistence of diverse food vending sites, widespread across the city. Kiosks and fast-food outlets are widely available in the city centre, and supermarkets are more concentrated in peripheral areas of the city. Westernized food options, such as French fries, burgers, pizza, chicken nuggets and donuts, were widely available, reflecting the significant influence of the westernized diet in this food environment. Moreover, a high number of the foods sampled were nutritionally inadequate with respect to their TFA, sodium and potassium content.

Both homemade and industrial foods showed high levels of TFA, with nearly 30% of all food categories collected failing to meet Ukraine's new national regulations, which require TFA content to remain below 2 g per 100 g of total fat. This limit is based on the recommendation that TFA intake should not exceed 1% of total caloric intake, based on an average daily intake of 2000 calories (27) emphasizing the importance of considering total caloric intake in evaluating the public health impact of TFA in foods. Moreover, foods that meet the TFA content limit but are exceedingly high in total fat can still pose significant health risks to consumers. Furthermore, the adverse effects of total saturated fats in foods must not be overlooked. To underscore this, we measured the total fat content of the foods collected. A comprehensive assessment of the total fat content and complete fatty acid composition, including TFA, in foods is essential in translating these results into public health advice (Annex 3).

Specific food categories such as industrial margarine, milk-based desserts and homemade sweet pastries contained high levels of TFA. These findings are consistent with evidence from other countries of the WHO European Region, where foods containing TFA were common in urban food environments (17–19,28,29). Given the widespread availability of these foods, they may contribute to excessive TFA intake, which is strongly linked to an increased risk of cardiovascular diseases, a leading cause of death in Ukraine (4). Compounding this issue, a recent survey conducted by the Kyiv International Institute of Sociology revealed that 73% of respondents believe their diet does not include foods with trans-fats (30). This may suggest a lack of awareness about the presence of TFA in foods, potentially limiting consumers' ability to make healthier choices.

The findings of this study revealed, additionally, that many foods contained high sodium levels, with six out of the 39 food categories analysed exceeding half or surpassing the maximum daily recommended amount of sodium in a single serving (homemade burgers, hot dogs, shawarma, falafel, pizza and industrial chips). Regular consumption of these foods could easily lead individuals to exceed the recommended sodium limit of 2000 mg/day. Most of these foods were homemade, as found in other countries (17–19,28,29), which underlines the critical role of food vendors and retailers in providing nutritionally adequate meals.

In addition, the analysed foods generally had low levels of potassium. Mean sodium-to-potassium ratios were above the recommended value of one in all homemade food options, and in 18 out of the 25 collected industrial foods. However, some traditional foods containing vegetables (such as shawarma and falafel) provided high amounts of this nutrient, at around a quarter of the minimum daily recommendation. This suggests that it should be possible to enrich other homemade food options by including more vegetables, which in addition to being high in potassium, are also a source of other important micronutrients, as well as fibre.

These results may assist in the identification of priorities for public health action. WHO recommends a set of evidence-based cost-effective interventions to tackle NCDs (31), which encompass improving food environments to prevent and control NCDs by 2025 (10). The “best buys” for promoting healthier diets and food environments include reformulating food and beverage products to eliminate TFA and reduce unhealthy ingredients like saturated fats, free sugars and sodium; implementing front-of-pack labelling to help consumers make healthier choices; adopting public food procurement policies that prioritize nutritious options; and launching behaviour change campaigns and mass media initiatives to encourage the consumption of healthier foods like legumes, whole grains, fruits and vegetables, while reducing intake of unhealthy components (31).

Regulatory measures would contribute to achieving effective TFA reduction in industrially produced foods through product reformulation, a development observed in many countries (32). In Ukraine, the national regulation to eliminate TFA (MoH Order No. 1613 (14) was introduced in the same month in which data collection for this study began (October 2023). The results from this study can serve as a baseline for monitoring Ukraine's progress towards eliminating TFA. They can be used to inform the development of strategies and continuous monitoring and enforcement systems.

WHO created the REPLACE action package, which describes the necessary steps to eliminate industrially produced TFA (13). This includes reviewing the dietary sources of industrially produced TFA; promoting the replacement of industrially produced fats with healthier fats and oils; legislating to eliminate industrially produced TFA, where Ukraine has already taken action; assessing and monitoring TFA content in the food supply, for which the results from this study can be used; and creating awareness among the population, policy-makers and suppliers and enforcing compliance.

The results of this study also suggest that the Ukrainian government could consider setting targets for sodium reduction in processed foods, a measure that has been successful in decreasing population sodium intake in other countries (33,34). Despite ongoing sodium reduction efforts (12), limited data show that sodium intake in Ukraine (12.6 g/day) (5) still exceeds WHO's recommended maximum of 2 g/day, and is more than double the target set for reducing blood pressure and cardiovascular risks (5). Global sodium benchmarks, established by WHO, may serve as another crucial tool for guiding national policies and strategies, in view of this study's findings. They provide clear targets for sodium levels across various food categories, potentially supporting efforts to reformulate food products and drive progress in sodium reduction (35).

Improving the nutritional information on food packages could further strengthen compliance with legislation. In 2020, Ukraine adopted new labelling requirements, in which the nutrition declaration must include energy, total fat, saturated fat, carbohydrates, sugar, protein and salt (36). However, it is not mandatory to include TFA on such labelling and adding this nutrient to the declaration could be an additional measure to strengthen compliance with legislation.

Front-of-package labelling, which has successfully been employed by many countries in the WHO European Region to promote product reformulation and assist consumers in making healthier choices (37), could be a valuable tool in Ukraine. WHO has created a manual with a five-step approach to developing and implementing an evidence-based front-of-package labelling system (38). Moreover, education campaigns to raise consumer awareness and improve health and nutrition literacy could be relevant to ensure that individuals have the knowledge and skills necessary to make informed decisions.

In addition, increasing food vendors' awareness about the importance of decreasing the addition of salt and other high-sodium processed ingredients (such as sauces, seasonings and stock) during cooking and food preparation, and providing them with skills to improve recipes without compromising taste and consumer acceptance, could encourage the use of lower-sodium alternatives while maintaining food quality. For retailers, it may be important to note that among industrial foods, savoury options such as chips, dry breadcrumbs, frozen pies and processed meats presented the highest sodium contents, both per serving and per 100 g. Further to this, fiscal policies that subsidize healthier foods, which have been implemented in countries worldwide (39), have the potential to encourage vendors and small-scale manufacturers in particular to shift to more nutritionally adequate ingredients. Limited government funds may represent, however, an obstacle for this strategy during war time.

The implementation of strategies to promote healthier food environments in Ukraine would require a multisectoral approach, through the engagement of policy-makers with food manufacturers, vendors and consumers. Ukraine has implemented the National Action Plan for Non-Communicable Disease Prevention, Control and Health Promotion (40), and the priorities for reducing trans- and saturated fat, as well as sodium intake, are part of this plan (41). Therefore, such strategies could be easily integrated into already existing policies.

The FEEDcities project aims to assess urban street food environments in cities in central Asia and eastern Europe. The study framework has the potential to be a monitoring tool and to assist in policy-making, especially in monitoring risk factors for the development of NCDs (20, 21). This was the first study based on an extension of the original protocol, making use of its monitoring potential to tackle the objective of assessing the levels of nutrients (namely TFA, sodium and potassium) in foods frequently available in the food environment. By providing data on the TFA, sodium and potassium contents of dietary sources in the urban food environment of Lviv, this report contributes to the evidence base to guide the implementation of strategies towards improving the nutritional profiles of these foods. Opportunities for action are identified to reduce TFA and sodium intake in Ukraine, while protecting the local gastronomic identity, and supporting vendors' economic activity. Promoting the production, access and consumption of safe, healthy and affordable foods should be prioritized, in order to achieve better health for all.

Lviv, and Ukraine in general, are currently experiencing conflict, and the vending sites assessed in this study may not be representative of all the food acquisition places. Other ways of purchasing or acquiring foods could be, for example, online supermarkets or meal-delivery apps, home gardens and food exchanges, to name a few. Therefore, in the future, it could be relevant to extend the monitoring to other elements of the food environment, such as the digital food environment (42), to allow a more comprehensive understanding of the real scenario.



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Annex 1. Examples of industrial foods collected

Biscuit sandwiches with cream or filling



Salty sticks



Cake



Wafers



Chips



Butter



Chocolate/ chocolate bars/ chocolate candies



Cheese product (cheese spread)



**Cookies
(shortbread)**



**Frozen
pie**



Croutons



**Frozen
croissants**



**Keks
(muffin)**



**Frozen
syrnyky**



Donut



**Hard
cheese**



Prianyky
(with or
without
filling)



Margarine



Ice
cream



Mayonnaise



Milk-based
dessert



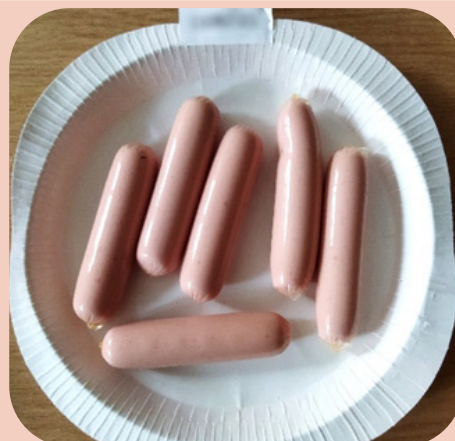
Processed
cheese



Non-
chocolate
candies



Processed
meat



**Oatmeal
cookies**



Annex 2. Examples of homemade foods collected

Burger



French fries



Cake



Hot dog



Chicken nuggets



Crepe (cheese)



Croissant



Crepe (banana and chocolate cream)



**Deep-fried
cheese**



**Panini
(sandwich)**



**Shawarma/
Kebab**



Pizza



Falafel



**Savoury
astry**



**Sweet
pastry**



Annex 3. Supplementary tables

Table A3.1. Nutritional composition per serving and per 100 g of food samples collected in Lviv (total fat and fatty acid profile)

		Serving size	Total fat	Saturated fatty acids	Monounsaturated fatty acids	Polysaturated fatty acids	n-6 fatty acids	n-3 fatty acids	Trans fatty acids
	n	Mean (min–max) g	Mean (min–max) g/100 g	Mean (min–max) g/100 g	Mean (min–max) g/100 g	Mean (min–max) g/100 g	Mean (min–max) g/100 g	Mean (min–max) g/100 g	Mean (min–max) g/100 g
Homemade									
Cake	8	171 (74–350)	14.6 (9.3–18.8)	8.0 (2.7–12.3)	3.9 (2.4–5.0)	1.7 (0.4–4.8)	1.6 (0.4–4.8)	0.2 (0.0–1.6)	0.3 (0.1–0.9)
Chicken nuggets	2	152 (104–200)	12.3 (12.0–12.5)	2.6 (1.4–3.7)	5.5 (3.3–7.7)	3.6 (2.8–4.5)	3.6 (2.8–4.5)	0.0 (0.0–0.0)	0.0 (0.0–0.0)
Croissants	4	87 (66–102)	22.0 (21.0–24.3)	12.3 (9.5–16.1)	6.1 (4.9–7.0)	2.3 (0.8–4.3)	2.2 (0.7–4.3)	0.0 (0.0–0.0)	0.4 (0.3–0.4)
Deep-fried cheese	2	100 (79–122)	15.7 (14.6–16.7)	4.0 (3.2–4.7)	6.7 (4.1–9.3)	4.2 (1.8–6.6)	4.2 (1.8–6.6)	0.0 (0.0–0.0)	0.0 (0.0–0.1)
Falafel	2	398 (345–450)	14.4 (11.7–17.0)	1.9 (1.4–2.4)	4.2 (3.3–5.1)	7.5 (6.6–8.4)	7.5 (6.6–8.4)	0.0 (0.0–0.0)	0.2 (0.0–0.4)
Fried potatoes	4	118 (83–200)	10.5 (6.3–15.0)	1.4 (0.7–1.7)	3.0 (1.7–4.5)	5.7 (3.6–8.2)	5.7 (3.6–8.2)	0.0 (0.0–0.0)	0.0 (0.0–0.0)
Burgers	4	180 (97–270)	5.9 (3.7–8.8)	1.3 (0.7–2.0)	2.5 (1.0–3.8)	1.8 (0.4–3.8)	1.8 (0.3–3.8)	0.0 (0.0–0.0)	0.0 (0.0–0.1)
Hot dogs	4	324 (175–440)	6.0 (5.5–6.8)	1.6 (1.4–1.9)	2.1 (1.9–2.6)	2.0 (1.7–2.2)	2.0 (1.7–2.2)	0.0 (0.0–0.0)	0.1 (0.0–0.1)
Crepes	4	181 (80–260)	8.1 (6.2–9.8)	2.5 (2.1–2.8)	2.7 (2.3–3.0)	2.5 (0.8–3.9)	2.5 (0.8–3.9)	0.0 (0.0–0.0)	0.1 (0.0–0.1)
Panini	6	135 (75–223)	10.1 (3.6–17.0)	3.5 (0.8–7.2)	3.0 (1.0–5.5)	2.7 (1.1–4.9)	2.7 (1.1–4.9)	0.0 (0.0–0.0)	0.4 (0.1–1.1)
Pizza	4	168 (125–240)	5.7 (4.6–6.8)	1.9 (1.6–2.2)	2.0 (1.5–2.4)	1.4 (0.9–1.9)	1.4 (0.9–1.9)	0.0 (0.0–0.0)	0.2 (0.0–0.5)
Savoury pastries	6	120 (97–143)	10.5 (5.4–14.3)	4.6 (1.0–7.6)	3.3 (1.6–5.3)	1.8 (0.8–3.3)	1.8 (0.8–3.3)	0.0 (0.0–0.0)	0.3 (0.1–0.6)
Lyulya kebab	4	424 (380–450)	11.5 (9.0–17.0)	2.5 (1.5–4.1)	3.5 (2.8–4.9)	4.9 (3.3–7.1)	4.9 (3.3–7.1)	0.0 (0.0–0.0)	0.1 (0.0–0.3)
Sweet pastries	6	72 (18–175)	9.2 (2.0–20.9)	3.5 (0.6–9.5)	3.5 (0.6–8.3)	1.3 (0.4–2.1)	1.3 (0.4–2.1)	0.0 (0.0–0.0)	0.5 (0.0–2.6)
Industrial									
Oatmeal cookies	2	78 (66–90)	12.5 (12.0–13.0)	4.1 (3.9–4.3)	4.7 (3.8–5.7)	2.9 (2.5–3.3)	2.8 (2.4–3.2)	0.1 (0.1–0.1)	0.2 (0.0–0.3)
Biscuits (sandwich with filling)	4	61 (45–87)	16.3 (6.1–23.4)	10.1 (4.5–15.0)	3.5 (0.7–5.7)	2.0 (0.7–4.5)	1.9 (0.7–4.4)	0.1 (0.0–0.1)	0.0 (0.0–0.0)
Biscuits (shortbread)	3	35 (21–52)	12.4 (9.1–15.4)	3.7 (0.7–6.1)	6.5 (6.0–7.1)	1.6 (0.9–2.1)	1.5 (0.8–2.0)	0.2 (0.1–0.3)	0.0 (0.0–0.1)
Butter product/ spread	2	40 (40–40)	50.2 (30.8–69.7)	19.9 (12.5–27.3)	16.7 (9.2–24.3)	11.3 (7.7–14.9)	11.0 (7.5–14.5)	0.3 (0.2–0.4)	0.1 (0.1–0.1)
Cake	3	57 (45–75)	13.2 (8.3–16.6)	7.2 (5.3–9.5)	4.3 (2.1–5.8)	0.9 (0.3–1.5)	0.8 (0.3–1.4)	0.1 (0.0–0.1)	0.3 (0.0–0.6)
Candies (non-chocolate)	2	53 (45–62)	14.6 (1.4–27.9)	6.7 (0.7–12.7)	5.9 (0.4–11.3)	1.3 (0.1–2.5)	1.3 (0.1–2.5)	0.0 (0.0–0.1)	0.0 (0.0–0.0)
Cheese	2	40 (40–40)	16.5 (11.0–22.0)	7.3 (5.0–9.5)	6.4 (4.1–8.7)	1.6 (0.9–2.4)	1.6 (0.8–2.3)	0.1 (0.0–0.1)	0.4 (0.4–0.5)
Chips	2	75 (75–75)	34.1 (33.9–34.2)	9.1 (3.0–15.1)	12.2 (10.2–14.3)	11.3 (3.3–19.2)	11.0 (3.2–18.8)	0.2 (0.1–0.4)	0.0 (0.0–0.0)
Chocolate	4	55 (45–73)	32.1 (22.2–44.4)	16.1 (12.5–20.6)	12.2 (7.5–21.8)	2.3 (1.1–4.0)	2.2 (1.1–3.8)	0.1 (0.1–0.1)	0.0 (0.0–0.1)
CROUTONS	2	300 (200–200)	18.5 (6.6–30.4)	5.9 (0.7–11.2)	7.8 (1.8–13.9)	3.9 (3.8–4.0)	3.8 (3.8–3.9)	0.1 (0.0–0.1)	0.0 (0.0–0.0)
Desserts (milk-based)	2	64 (63–65)	6.0 (5.0–7.0)	2.3 (1.4–3.2)	2.1 (1.3–2.8)	0.4 (0.2–0.7)	0.4 (0.2–0.7)	0.0 (0.0–0.0)	1.0 (0.1–1.8)
Frozen croissants	2	50 (30–70)	7.8 (5.1–10.5)	3.4 (1.4–5.3)	2.9 (2.0–3.8)	0.7 (0.5–0.9)	0.7 (0.5–0.9)	0.0 (0.0–0.0)	0.5 (0.0–1.0)
Frozen pies	2	44 (44–44)	13.6 (12.3–14.8)	4.4 (3.7–5.1)	4.5 (4.1–4.8)	3.8 (3.7–3.9)	3.7 (3.6–3.8)	0.1 (0.1–0.1)	0.3 (0.0–0.6)
Frozen syrnky	2	46 (42–50)	3.5 (3.0–4.0)	2.1 (1.9–2.3)	1.0 (0.8–1.2)	0.1 (0.1–0.2)	0.1 (0.1–0.2)	0.0 (0.0–0.0)	0.1 (0.1–0.1)
Hard cheese	2	40 (40–40)	12.5 (3.0–22.0)	7.5 (1.0–14.0)	3.4 (1.2–5.6)	0.7 (0.6–0.8)	0.6 (0.5–0.8)	0.0 (0.0–0.0)	0.4 (0.2–0.6)
Ice cream	2	90 (80–100)	20.0 (15.0–25.0)	14.0 (6.0–22.0)	3.5 (1.5–5.5)	1.2 (0.4–2.0)	1.1 (0.4–1.9)	0.0 (0.0–0.1)	0.5 (0.0–0.9)
Keksy (muffins)	2	80 (60–100)	19.1 (16.5–21.7)	2.9 (2.1–3.6)	5.5 (4.9–6.1)	9.9 (8.8–11.0)	9.7 (8.7–10.8)	0.2 (0.2–0.2)	0.0 (0.0–0.0)
Margarine	2	40 (40–40)	56.2 (56.0–56.5)	19.9 (16.1–23.7)	22.2 (20.9–23.4)	6.1 (5.7–6.4)	6.0 (5.7–6.3)	0.1 (0.0–0.2)	5.7 (0.1–11.3)
Mayonnaise	2	40 (40–40)	45.4 (35.6–55.1)	4.1 (3.2–5.0)	13.4 (10.8–16.0)	25.8 (19.9–31.7)	25.3 (19.5–31.1)	0.5 (0.4–0.6)	0.0 (0.0–0.0)
Processed cheese	3	40 (40–40)	16.2 (14.7–18.3)	9.0 (7.1–10.2)	5.2 (3.6–8.2)	1.1 (0.5–2.2)	1.0 (0.5–2.0)	0.1 (0.0–0.1)	0.3 (0.0–0.5)
Processed meat	4	45 (40–48)	13.9 (10.4–20.6)	5.7 (2.7–7.4)	5.3 (2.6–8.2)	2.2 (0.6–4.1)	2.1 (0.6–3.9)	0.1 (0.0–0.1)	0.1 (0.0–0.3)
Prianyky	2	90 (68–111)	6.8 (3.1–10.5)	4.7 (0.5–9.0)	0.8 (0.7–0.8)	1.0 (0.3–1.7)	1.0 (0.3–1.6)	0.0 (0.0–0.0)	0.0 (0.0–0.0)
Salty sticks	2	40 (40–40)	5.6 (4.9–6.2)	2.0 (1.4–2.6)	2.2 (2.0–2.3)	1.1 (1.0–1.2)	1.1 (0.9–1.2)	0.0 (0.0–0.0)	0.0 (0.0–0.0)
Sweet donuts	2	73 (65–80)	15.0 (5.4–24.5)	6.2 (1.0–11.4)	5.3 (1.7–9.0)	2.7 (2.5–2.8)	2.6 (2.4–2.7)	0.1 (0.1–0.1)	0.1 (0.0–0.3)
Wafers	3	53 (50–55)	20.2 (14.8–23.5)	7.3 (4.9–9.9)	9.3 (5.9–11.9)	2.6 (2.2–3.4)	2.5 (2.0–3.3)	0.1 (0.1–0.2)	0.0 (0.0–0.0)

Source: authors

Table A3.2. Prices of the food samples collected, in local currency (hryvnia, ₴), per serving and per 100 g of food

		Serving size		Food price/serving		Food price/100 g	
	n	Mean (min–max) g		Mean (min–max) ₺		Mean (min–max) ₺	
Homemade							
Cake	8	171	(74–350)	127.00	(38.33–347.70)	77.27	(27.58–126.36)
Chicken nuggets	2	152	(104–200)	113.19	(75.00–151.38)	91.25	(37.50–145.00)
Croissants	4	87	(66–102)	52.00	(35.00–65.00)	62.06	(34.21–79.27)
Deep-fried cheese	2	100	(79–122)	58.63	(32.25–85.00)	55.44	(40.93–69.96)
Falafel	2	398	(345–450)	132.50	(130.00–135.00)	33.84	(30.00–37.68)
Fried potatoes	4	118	(83–200)	71.75	(50.00–100.00)	68.05	(42.50–120.05)
Burgers	4	180	(97–270)	76.00	(52.00–97.00)	44.97	(33.33–57.06)
Hot dogs	4	324	(175–440)	62.50	(40.00–80.00)	19.82	(18.18–22.86)
Crepes	4	181	(80–260)	88.88	(43.00–145.00)	52.58	(19.15–81.67)
Panini	6	135	(75–223)	76.17	(36.00–210.00)	51.56	(29.63–94.17)
Pizza	4	168	(125–240)	46.94	(37.25–60.50)	30.49	(18.75–48.40)
Savoury pastries	6	120	(97–143)	58.99	(11.99–130.00)	46.70	(12.40–91.23)
Lyulya kebab	4	424	(380–450)	146.00	(140.00–150.00)	34.63	(31.11–38.16)
Sweet pastries	6	72	(18–175)	30.51	(17.00–50.00)	97.01	(16.64–279.33)
Industrial							
Oatmeal cookies	2	78	(66–90)	8.02	(7.62–8.42)	10.61	(8.47–12.76)
Biscuits (sandwich with filling)	4	61	(45–87)	13.53	(9.80–19.50)	22.38	(19.56–25.78)
Biscuits (shortbread)	3	35	(21–52)	4.01	(2.22–6.62)	11.00	(9.67–12.76)
Butter product/ spread	2	40	(40–40)	6.85	(6.18–7.52)	17.13	(15.45–18.80)
Cake	3	57	(45–75)	23.63	(11.75–38.65)	40.20	(23.50–51.53)
Candies (non-chocolate)	2	53	(45–62)	14.12	(7.40–20.83)	25.07	(16.44–33.71)
Cheese	2	40	(40–40)	6.85	(6.83–6.86)	17.11	(17.08–17.15)
Chips	2	75	(75–75)	33.32	(31.73–34.91)	44.43	(42.31–46.55)
Chocolate	4	55	(45–73)	20.72	(15.45–29.00)	39.53	(23.89–58.00)
Croutons	2	64	(63–65)	15.63	(10.35–20.90)	24.36	(16.56–32.15)
Desserts (milk-based)	2	200	(200–200)	28.35	(23.20–33.50)	14.18	(11.60–16.75)
Frozen croissants	2	50	(30–70)	16.19	(8.96–23.42)	31.66	(29.87–33.46)
Frozen pies	2	44	(44–44)	15.46	(13.52–17.39)	35.29	(30.87–39.70)
Frozen syrnyky	2	46	(42–50)	14.57	(13.23–15.90)	31.80	(31.80–31.80)
Hard cheese	2	40	(40–40)	11.62	(4.23–19.01)	29.05	(10.58–47.53)
Ice cream	2	90	(80–100)	79.30	(28.70–129.90)	82.89	(35.88–129.90)
Keksy (muffins)	2	80	(60–100)	23.50	(17.99–29.00)	29.49	(29.00–29.98)
Margarine	2	40	(40–40)	5.63	(5.60–5.65)	14.06	(14.00–14.13)
Mayonnaise	2	40	(40–40)	27.07	(8.45–45.69)	67.68	(21.13–114.23)
Processed cheese	3	40	(40–40)	13.05	(7.15–16.57)	32.62	(17.88–41.43)
Processed meat	4	45	(40–48)	12.54	(10.22–14.85)	27.64	(23.62–31.26)
Prianyky	2	90	(68–111)	16.34	(14.40–18.28)	19.91	(12.97–26.84)
Salty sticks	2	40	(40–40)	2.60	(1.74–3.45)	6.49	(4.35–8.63)
Sweet donuts	2	73	(65–80)	13.77	(9.83–17.70)	19.76	(12.29–27.23)
Wafers	3	53	(50–55)	11.17	(7.91–14.00)	21.28	(14.92–25.69)

Annex 4. Glossary

Cheese: a dairy product derived from the curdling and coagulation of milk (usually from cows, goats or sheep). This process involves using enzymes such as rennet or acid to curdle the milk, followed by separating the curds from the whey, and often additional processes like pressing, aging and curing. Cheese comes in many varieties, textures and flavours, depending on the type of milk used, the production process and the aging period. It is a natural product that contains milk, salt and sometimes bacterial cultures or mould.

Cheese product: a term used to describe food items that contain some cheese but may also have additional ingredients and additives. These products, which are not entirely made of cheese, may include emulsifiers, stabilizers, preservatives and artificial flavours. As a result, their nutritional profile may differ from natural cheese, as they may contain added fats, sugars or other ingredients. Examples of cheese products include processed cheese slices, cheese spreads and cheese sauces. The collected samples in this study correspond to cheese spreads.

Hard cheese: refers to a category of cheese that is characterized by its firm texture and lower moisture content compared to softer varieties. These cheeses are typically aged for longer periods, which helps develop a concentrated, robust flavour profile.

Processed cheese: a type of cheese that is typically made by blending natural cheeses with additives and heating them together. It may have added ingredients like vegetable oils, which can increase the fat content, and often contains additional ingredients such as emulsifiers, preservatives and stabilizers to give it a longer shelf life and specific texture.

Falafel: is a popular Middle Eastern food consisting of deep-fried balls or patties made from ground chickpeas or fava beans, or a combination of both. While it can be consumed alone, it is usually served as a sandwich made with flatbread. It is a traditional dish with a high gastronomic and cultural significance, often enjoyed as street food or a part of a larger meal.

Panini (sandwich): is typically made with bread, which is sliced horizontally, filled with various ingredients, and then pressed and toasted to create a crispy exterior and melted interior. Panini (sandwich) is a combination of toasted bread, melted cheese and flavourful fillings that can be customized to suit a wide range of tastes and dietary preferences (usually ham, turkey, salami or prosciutto, cheese and vegetables).

Prianyky: is a traditional eastern European spice cookie or gingerbread-like cake, known for its distinctive flavour and decorative designs. These sweet treats are often associated with festive occasions, holidays and cultural traditions. The ingredients include flour (typically wheat flour is used), honey, spices (common spices include cinnamon, ginger, cloves, nutmeg and cardamom), eggs, sugar and leavening agents.

Syrnyky: are traditional eastern European cheese pancakes made from fresh farmer's cheese (which is similar to cottage cheese or quark) with flour, eggs and sugar. This is a popular breakfast or dessert item in Ukraine and other eastern European countries.

Shawarma: is a dish of Middle Eastern origin made from thin slices of meat. It is often served in wraps or sandwiches.

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World Health Organization Regional Office for Europe

UN City, Marmorvej 51,
DK-2100, Copenhagen Ø, Denmark
Tel.: +45 45 33 70 00
Fax: +45 45 33 70 01
Email: eurocontact@who.int
Website: www.who.int/europe