World Health Organization

European Region

FEEDcities project – extension of the research protocol for monitoring the content of specific nutrients in food products

Ukraine assessment

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Abstract

The FEEDcities project aims to assess urban street food environments in cities in central Asia and eastern Europe, with the ultimate goal of informing policy-making in monitoring dietary risk factors for noncommunicable diseases. Ukraine is one of the WHO European Region countries currently taking action to ban trans-fats from foods. Starting from 3 October 2023, an order from the Ministry of Health of Ukraine aims to limit the content of trans-fatty acids to not more than 2 g per 100 g of the total amount of all fats contained in food products. This document aims to provide a framework for the extension of the FEEDcities methodology, making use of its monitoring potential, to tackle the objective of assessing the composition of specific nutrients in foods. It also aims, in particular, to describe the methodology to be implemented in the city of Lviv, Ukraine.

Keywords

FAST FOODS
FOOD ANALYSIS
UKRAINE
POTASSIUM
SODIUM
SUGARS
TRANS FATTY ACIDS

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Contents

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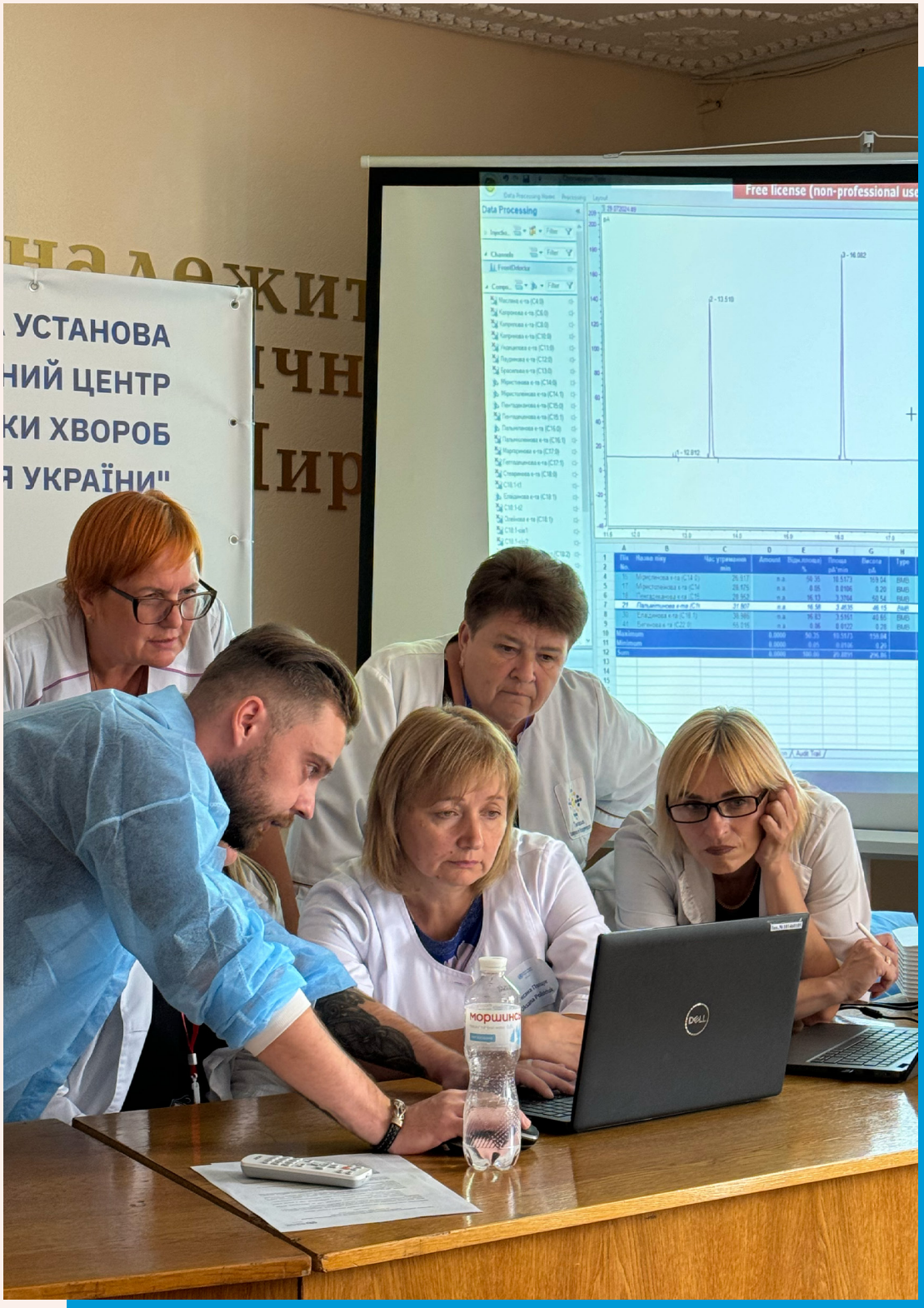
Abbreviations

ERC	Ethics Review Committee (WHO)
MoH	Ministry of Health of Ukraine
NCD	noncommunicable disease
RTE	ready-to-eat
SSUFSCP	State Service of Ukraine on Food Safety and Consumer Protection
TFA	trans-fatty acids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Context

The main goal of the FEEDcities research project is to assess urban street food environments in cities in central Asia and eastern Europe. Street food is a cultural, social and economic phenomenon typical of urban areas, where the time dedicated to cooking at home has been decreasing over time *(1)*. Nevertheless, foods purchased from street vendors may also contribute significantly to excessive intake of energy and some nutrients. The urban street food environment is expected, thus, to reflect the food habits of the population and also to influence dietary patterns, facts that highlight the importance of characterizing and monitoring the street food offer in the context of the prevention of noncommunicable diseases (NCDs).

The Food and Agriculture Organization of the United Nations and WHO define street foods as "ready-to-eat foods and beverages prepared and/or sold by vendors or hawkers, especially in the streets and other similar places"*(2)*. In the FEEDcities surveys conducted in 2016–2021 *(3–9)*, particularities related to the organization and distribution of these urban (street) food environments led researchers to hypothesize a possible transition from food environments where the populations acquire food mainly through informal food markets, to those where consumers rely on both informal and formal food environments. This process, described as the "Global food environment transition", where built environments shift from traditional to modern retail outlets *(10)*, has implications for the street food environment scenario. Street food vending sites were mostly located inside or near public markets and were stationary (particularly in the most developed settings). In eastern European cities, more formal vending sites, such as stands and kiosks, were more prevalent *(3,5,6)*. In addition, in some settings, takeaway establishments – bakeries and traditional barbecue and pie places – were part of the street food scene *(3,5).* These findings reinforce the need to consider an evolving notion of the street food environment, possibly enlarged to the places within the wider food environment where the population can acquire foods to eat "on the go" that require no or little preparation or cooking. This might have implications in expanding the eligible types of vending sites to be considered in future FEEDcities assessments.

The original FEEDcities study protocol *(11)* applied 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. It was designed to be easily adapted to different typologies of street food vending sites and patterns of distribution throughout cities. The FEEDcities framework has the potential to be used as a monitoring tool *(12)*, having been referenced by the WHO Regional Office for Europe as a good practice for standardized measurement of the sodium content of foods sold in street food outlets and markets *(13)*. This highlights its potential as a tool for assisting policy-making, especially in monitoring risk factors for the development of NCDs, namely monitoring the levels of other nutrients in foods, beyond sodium (e.g. trans-fatty acids (TFA), sugars etc.).

This document aims to provide a framework for the extension of the FEEDcities methodology, making use of its monitoring potential, to tackle the objective of assessing the composition of specific nutrients in foods. It also aims, in particular, to describe the methodology to be implemented in the city of Lviv, Ukraine.

The protracted emergency and the urban food environment in Ukraine

Ukraine is one of the WHO European Region countries currently taking action to ban trans-fats from foods, as called for by WHO *(14)*. Starting on 2 October 2023, Order No. 1613 of the Ministry of Health of Ukraine "On approval of the rules for adding vitamins, minerals and some other substances to food products" came into force *(15)*. According to this order, the content of TFA (except for "natural" trans-fats of animal origin) should not exceed 2 g per 100 g of the total amount of all fats contained in the food product. In reality, this means the complete elimination of trans-fats from food products, in full compliance with EU Regulation No. 649 (2019) *(16)*.

However, the country is currently undergoing an emergency situation caused by the war which started in February 2022. This created unprecedented sociopolitical and public health challenges, also reflected in the food environment. In the context of the protracted emergency and ongoing war, the Government of Ukraine has been undertaking

a dual approach: addressing the challenges caused by the war and continuing the reforms initiated in pre-war times. Addressing the risk factors for NCDs, including elimination of TFA, is one of the initiatives taken to support population health.

Despite the TFA legislation being in place from October 2023, a national monitoring mechanism has not yet been established, since the current emergency and war in Ukraine has changed government priorities in the face of much constrained resources. In addition, the public health system is not yet technically ready to monitor TFA. However, at the same time, the Ministry of Health of Ukraine (MoH), the Public Health Centre of Ukraine and the State Service of Ukraine on Food Safety and Consumer Protection (SSUFSCP) are participating in a laboratory capacity-building programme that was established by WHO in 2022.

Lviv is a city located in western in Ukraine, about 80 km from the border with Poland. It boasts a unique urban food environment that seamlessly blends rich culinary traditions with contemporary tastes. The city is renowned for its vibrant food culture, characterized by a myriad of charming cafes, bustling markets and diverse restaurants that cater to both locals and tourists, as well as internally displaced people who have moved in large numbers to Lviv since the start of the war.

Traditional Ukrainian dishes are abundant in Lviv's food scene, with iconic treats like *varenyky* (dumplings) and *borshch* (beetroot soup) readily available. At the same time, it is easy to find dishes of European origin (pizza, pasta etc.) and Asian cuisine (sushi, ramen, noodles etc.) both in restaurants and in modern fast-food outlets. The historic Central Market of the city, or Market Square, is a culinary paradise where there are various restaurants, fast-food outlets, cafes and coffee shops of different price segments and characteristics (original formats and franchises), as well as small grocery stores.

Lviv has witnessed a burgeoning trend of fusion and international cuisine in recent years. Modern eateries creatively blend flavours and techniques from various global cuisines, offering a wide array of options for the adventurous palate.

Coffee culture is another hallmark of Lviv, with a plethora of cafes serving aromatic brews that reflect the city's love affair with this beverage. The cafe atmosphere is often steeped in history and artistic ambience, making it an inviting space for both work and leisure. Usually, an important element of every coffee shop (both working as cafe or kiosk) is the selection of fresh pastries, desserts and sweets that are served with coffee. The most famous is *Lviv syrnyk* (Lviv cheesecake), which is available in most big and small coffee shops in the city.

Food festivals, such as the Lviv Food Festival, showcase the city's gastronomic diversity, attracting culinary enthusiasts from near and far to savour everything from tasty street food to exquisite gourmet creations.

Restaurant culture in Lviv is a vibrant and integral part of the city's identity. Known for its rich history and architectural charm, Lviv's restaurants often occupy historic buildings, creating a unique and atmospheric dining experience. In recent years, Lviv has seen a surge in gastropubs and trendy eateries, catering to a younger, cosmopolitan crowd. These establishments often fuse traditional recipes with modern cooking techniques, offering a delightful blend of flavours.

Overall, restaurant culture in Lviv reflects the city's commitment to preserving its heritage while embracing culinary innovation, making it a destination where food and culture harmoniously coexist.

Fast-food kiosks are a common sight in Lviv, offering quick and convenient options for both locals and tourists. These kiosks typically serve traditional Ukrainian street food like *syrniki* (cheese pancakes), hot dogs and *perepichka* (deep-fried sausages), providing a taste of local flavours on the go. On the other hand, kiosks offering doners, kebabs, falafel, croissants, paninis and so on are extremely popular. While these kiosks maintain a focus on traditional fare, there has been a growing trend of international fast-food chains setting up shop in Lviv, offering burgers, fries and other global favourites.

Fast-food kiosks are often strategically located near popular tourist areas and transport hubs, catering to travellers looking for a quick bite. They provide an affordable and accessible option for those exploring the city.

Supermarkets in Lviv have undergone significant transformations in recent years, aligning with global retail trends. Large supermarket chains operating across Ukraine have a strong presence in the city, offering a wide selection of

groceries, household items and even clothing. These supermarkets have adapted to modern consumer preferences by providing diverse products, including fresh local produce, international brands and organic options. Shoppers can find everything from traditional Ukrainian ingredients to imported goods from various corners of the world. Frozen dishes, which are a kind of compromise between home and restaurant food, are gaining significant popularity. Frozen meals can be prepared with minimal time investment, at the same time allowing to have a meal at home without the need to travel to a restaurant or cafe.

In Lviv, supermarkets often serve as more than just places to shop for essentials; they also function as social hubs, offering cafes, bakeries and even pharmacies within their premises. This convergence of services enhances the overall shopping experience for residents and visitors alike. Additionally, many supermarkets in Lviv have embraced digitalization, offering online shopping and home delivery services, making it even more convenient for locals to obtain their groceries. Overall, supermarkets are adapting to meet their customers' evolving needs and preferences while providing a convenient and diverse shopping experience.

The full-scale war in Ukraine has had a profound impact on the country's food industry. Conflict zones, especially in southern and eastern Ukraine, have seen disruptions in agricultural production and distribution due to the displacement of farmers and damage to infrastructure. This has led to food shortages and increased food prices in affected areas.

Furthermore, the ongoing conflict has strained the country's economy, making it more challenging for Ukrainians to afford basic necessities, including food. This economic instability has contributed to food insecurity for many families. The war has also disrupted trade routes, affecting the export of Ukrainian agricultural products to international markets. This has had consequences for the country's overall economic health and its ability to participate fully in the global food trade.

Despite these challenges, there have been efforts to support the food industry in Ukraine, including humanitarian aid programmes and initiatives to rebuild agricultural infrastructure. However, the long-term effects of the conflict on the food industry remain a significant concern for the country's stability and well-being.


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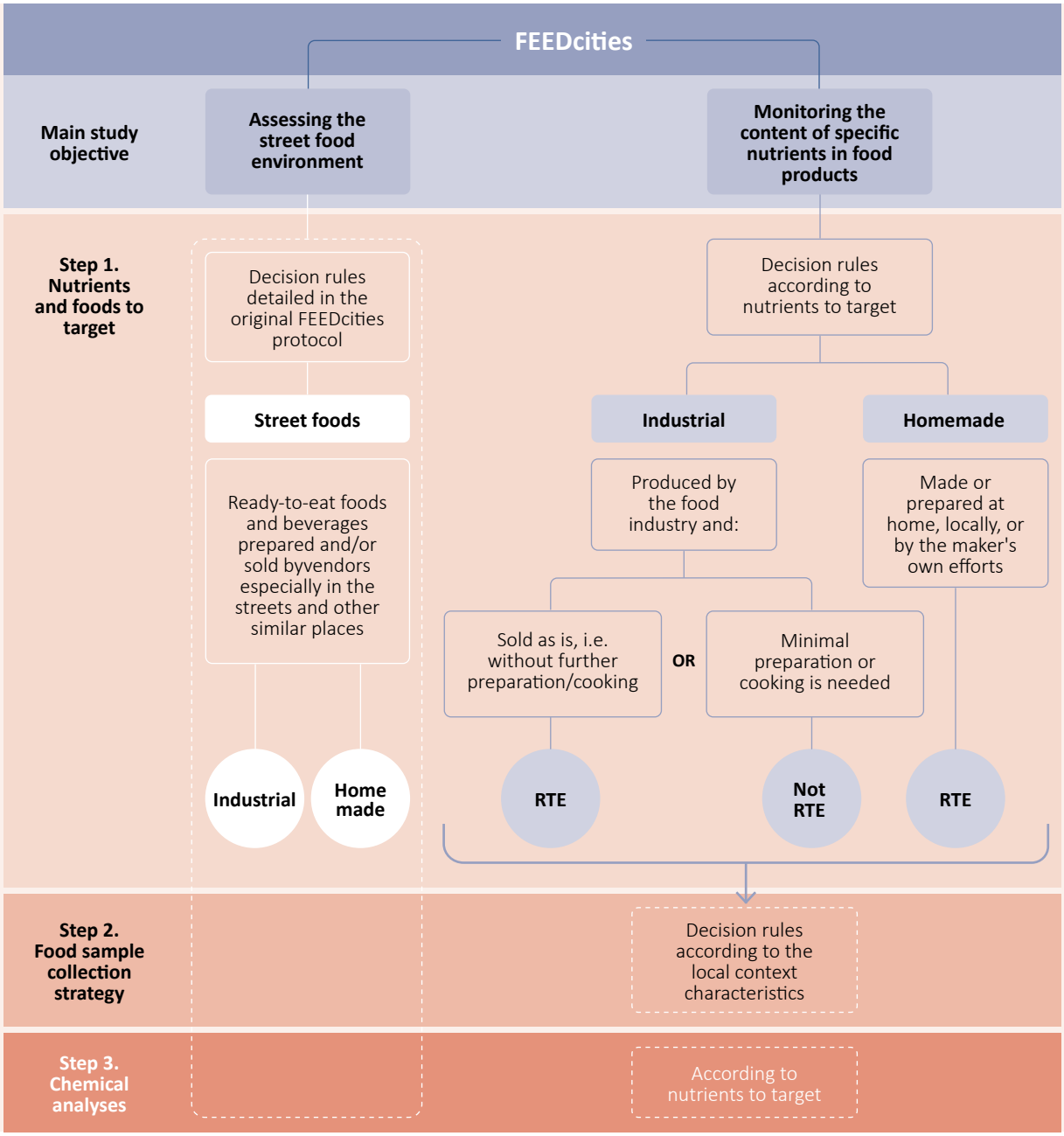
Methodology

This protocol provides an extension to the FEEDcities framework, grounded in a stepwise and standardized approach, to define the methodologies tailored to the specificities of each setting for monitoring the content of specific nutrients in foods. Step 1 comprises the selection of the nutrients to be targeted and, consequently, the foods to be collected; step 2 involves the definition of the food sample collection strategy, including the types of vending sites and geographical areas within the city to be covered; and step 3 requires the collection of food samples for chemical analysis. Different levels of data collection may be defined for each step.

The comprehensiveness of the options included in each step (step 1 – number of nutrients and different types of foods to target; step 2 – geographical areas to be covered within the city; step 3 – total number of samples and specific number of samples of the different types of food selected) depends on the availability of resources (Fig. 1). Throughout this document, the blue highlights in the flowcharts represent the initial decisions agreed upon among the research partners responsible for designing and implementing the FEEDcities study in Lviv, Ukraine. Amendments to the methodology might be needed upon encountering possible challenges during the study implementation in each specific setting.

Fig. 1. FEEDcities flowchart overview



Notes: RTE = ready-to-eat
Source: authors

Step 1. Identification of nutrient(s) to target and food items to select

The first decision in this step will be which nutrient(s) to target, which will probably be, in most cases, drawn from political and/or public health priorities at the national, regional and/or local level. Then, a list of food products to be selected and assessed through chemical analyses for the contents of a specific nutrient, or set of nutrients, will be defined in advance by a group of experts. Guidance criteria to account for in this decision process are described in Box 1.

The design of the study will be driven by this initial choice of nutrient(s) to be targeted, which will be the main focus of the survey. Nevertheless, the contents of other nutrients in the samples collected may also be assessed. For example, if the study is focusing primarily on TFA content, the foods chosen will be of high (or unknown but potentially high) TFA content; however, other nutrient contents (e.g. sodium or potassium) may also be evaluated, when that information is considered relevant, even if some of those foods would not be selected if the main objective was to assess those other nutrients.

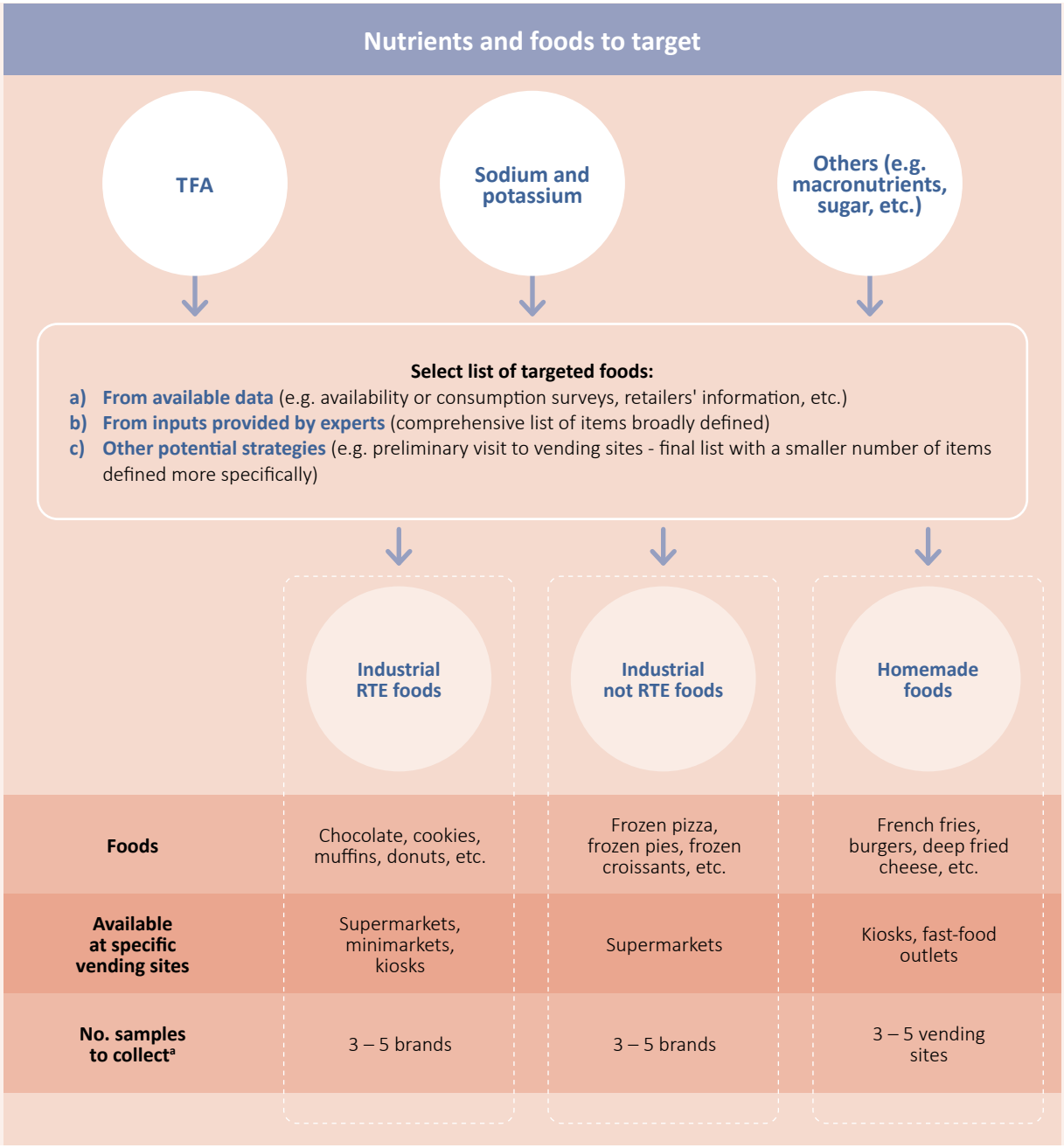
At this stage, it is important to clarify the definition of the several types of food products to be considered:

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

Ideally, the experts' decision should be informed by quantitative data on the population's food consumption or purchasing habits, which may be obtained from existing or ad hoc surveys or qualitative studies involving different types of stakeholders (e.g. the general population, selected consumers, managers of selling points), or from sales data. This may allow the definition of food items according to their typology (e.g. cookies), but also the corresponding brand(s) (in the case of industrial foods) and specify subtype(s) (e.g. type of cookies) to be evaluated. Alternatively, a more comprehensive list of food items of potential interest may be initially produced by the experts, based on the study objectives and their knowledge of the setting where the study will be conducted.

Then, data on the brands or subtypes of the items from this list that are most commonly available may be defined by direct observation in a sample of selling points (see Fig. 2). For example, if "chips" is one of the items on the list, observation of the products available at different selling points will allow the identification of the different brands available, and this will provide the basis for the definition of the most common brands of chips to be selected for analysis.

Fig. 2. Flowchart – nutrients and foods to target



[a] For an initial exploratory analysis, it may be more interesting to select the largest possible number of different foods samples (broader overview of the foods/brands with the highest contents in the target nutrients). For industrial foods, we may expect a larger variability between brands than between the same brand acquired in different selling points, and therefore the samples for analysis may be purchased in a small number of retailers, to reduce the burden on the research team. On the other hand, for homemade foods it is also relevant to collect samples of the same food product from different retailers, to capture the expected variability in composition across selling points.

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

For a food items defined in a more general way, such as “cookies”, this preliminary phase of data collection by direct observation may also be used to narrow down the definition of the item, depending on a) the most commonly available subtype (e.g. cookies with chocolate chips) and/or b) the subtype(s) the experts consider to be more relevant for the identification of a specific nutrient, before the brands to be sampled are defined.

The collection of data on the prices of different products may also be used to support the selection of products in different price ranges. A proposal for data to be retrieved through direct observation by field researchers is described in Box 2.

Box 2. Guidance information to be collected through direct observation, at each vending site

1) At all types of vending sites:

- date/time
- field researcher ID
- vending site ID
- location (e.g. administrative unit) + geographic coordinates
- characterization: kiosk, fast-food outlet or supermarket.

For each food identified in the list of foods selected by the experts:

At each vending site

- Available (yes/no)?
- If yes, which type(s) (e.g. cheeseburger, double hamburger, etc.; or cookies with chocolate chips, cookies with raisins, etc.)?
- For each type available, which brand(s)?
- For each item of a different type and/or brand, estimation of size (e.g. grams, millilitres) or photograph (if feasible), and price per unit.
- For each item available, price per unit.

2) Additionally, at supermarkets:

- for each item, package/serving size;
- for each item, nutritional composition/label (e.g. photograph, if possible/feasible) and ingredient list (e.g. photograph, if possible/feasible).

Note: ID = identifier

FEEDcities in Lviv

After the initial decision to focus primarily on the monitoring of the TFA contents of both industrial (including RTE and not RTE) and homemade (RTE) foods, a preliminary list of food items of interest has been drafted by a panel of Ukrainian experts in nutrition and public health (representatives from the MoH, Public Health Centre of Ukraine, Association of Nutritionists of Ukraine and WHO Country Office in Ukraine). The research team responsible for the design of the FEEDcities study in Ukraine has reviewed the inputs and a more concise and specific list is expected to be finalized soon (Annex 1).

The final list will be used by the field researchers as a "checklist", using either electronic or physical forms, for identifying the most commonly available food items (for each food item, different brands and subtypes available should be registered).

After gathering and analysing all these inputs, the panel of experts will define the final version of the list, including the homemade and industrial RTE and not RTE foods to be collected for chemical analyses.

Step 2. Food sample collection strategy

2.1 Number of food samples and sampling strategy

The overall number of food samples (study sample size), as well as the number of samples of each type of food to be collected (i.e. homemade, industrial RTE and industrial not RTE), are defined in accordance with the study objectives and the resources available. The study sample size is expected to impact the precision of the estimates and the extent to which the existing variability may be captured, which will be smaller for smaller study sample sizes.

For an initial exploratory analysis, it may be more interesting to select samples of the largest possible number of different foods types, to have a broad overview of the foods/brands with the highest contents of the target nutrient(s), instead of selecting multiple samples of the same type of food.

For industrial foods, we may expect a larger variability between brands than between the same brand acquired in different selling points, and therefore the samples for analysis may be purchased in a small number of retailers, to reduce the burden on the research team.

On the other hand, for homemade foods it is also relevant to collect samples of the same food product from different retailers, to depict the expected variability in composition across selling points. However, we expect the composition of products from food outlets of the same brand to be more homogeneous across selling points.

According to these underlying principles, the following sampling strategy is proposed (see Fig. 2):

- **Industrial foods**. For each item on the list, three to five brands of that type of product will be selected (three when a larger number of different food types is preferred or five when the variability across brands is considered to provide more relevant information).

- **Homemade foods.** For each item on the list, three to five vending sites, where they are available, of that type of product will be selected (three when aiming for a larger number of different food types or five when depicting the variability across different products of the same food type available in distinct vending sites is preferred).

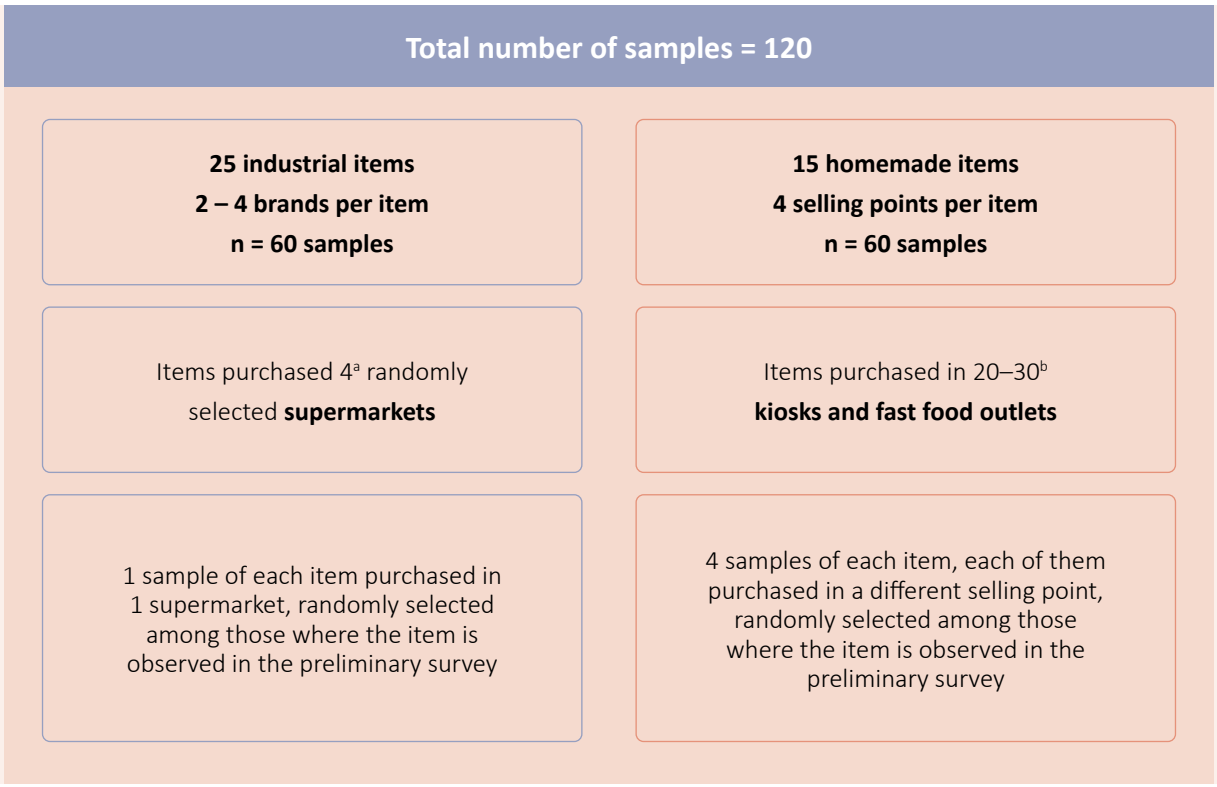
FEEDcities in Lviv

Preliminary discussions among the research team responsible for designing and implementing the FEEDcities study in Lviv led to the proposed approach described in Fig. 3. A total of 120 food samples were initially planned to be collected:

- Industrial foods: n = 25 food items x 2–4 different brands à n = 60 food samples
- Homemade foods: n = 15 food items x 4 different selling points à n = 60 food samples.

Further amendments to the methodology (and list of the foods to be collected) might be needed in response to possible challenges encountered during the study implementation.

Fig. 3. Preliminary approach agreed for food sample collection strategy in Ukraine.



[a] One of each supermarket chain.
[b] Final number to be defined depending on the total number identified in the study area.

Source: authors

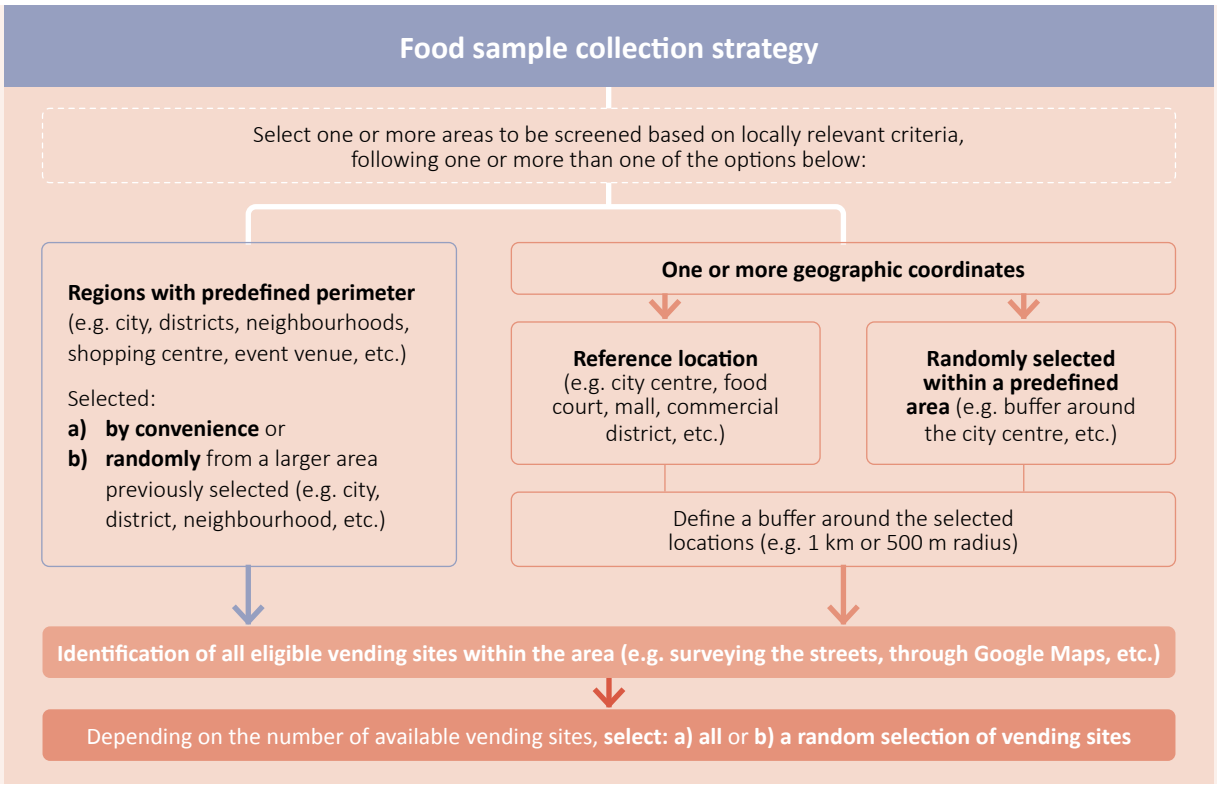
2.2 Selection of the vending sites where samples are to be collected

The eligible vending sites will be defined specifically for street food, homemade foods or industrial products.

- For the selection of vending sites selling street foods, see Fig. 3 of the FEEDcities original protocol *(11)*.
- For the selection of vending sites for homemade foods (those made or prepared at home, locally or by the maker's own efforts) see Fig. 4.
- For the selection of vending sites for other industrial foods (ready and not ready to eat), see Fig. 4.

The number of vending sites to be selected will depend on the number of samples of each type of food. For example, for industrial foods of the same brand, assuming the composition is relatively stable across selling points, these will only need to be purchased in large supermarkets, which are expected to be few in number across a given city. On the other hand, other RTE foods may have substantially different compositions across selling points, and the samples of each item should be purchased in different selling points, although samples of different items may be purchased in the same selling point.

Fig. 4. Food sample collection strategy



Source: authors

FEEDcities in Lviv

As of the end of 2021 the population of Lviv, according to the Lviv City Council, was 777 230, being the seventh largest city in Ukraine *(17)*. It is subdivided into six districts (Fig. 5): Frankivskyi, Halytskyi, Lychakivskyi, Shevchenkivskyi, Sykhivskyi and Zaliznychnyi.

Fig. 5. Administrative divisions of the city of Lviv, Ukraine

Data Source: Geoportal for the City of Lviv *(18)*

Preliminary discussions among the research team responsible for designing and implementing the FEEDcities study in Lviv led to the decision that a mapping of the types of eligible food vending sites (fast-food outlets, supermarkets and kiosks) per administrative unit would be essential to further refine the methodology for random selection of the sites where the food samples would be collected (whether concentrated on a region with a predefined perimeter, on one or more geographic coordinates, of a combination of both, for example depending on the frequency/distribution of the different types of eligible vending sites across the city). In an initial phase, an exploratory approach would be feasible, using Google Maps. The data gathered are described in Annex 2.

The analysis of this information allowed the definition of a strategy, adjusted to the specificities of Lviv, for the selection of selling points of different types – both for the data collection by direct observation (to support the decision-making process of defining the foods to be collected) and for the subsequent collection of food samples for analysis. The strategy defined was as follows:

- **Supermarkets.** One large supermarket of four of the identified chains will be randomly selected from the list of these supermarkets located in Lviv. For one of the chains, for which there are establishments of medium and large size, only the large-size supermarkets will be considered eligible for the random sampling. By representing supermarkets from all of the chains it will be possible to assess "white label" products specific to each chain. As such, a total of four large supermarkets will be surveyed.

- **Kiosks.** A comprehensive mapping of the kiosks in Lviv requires surveying the streets specifically for this purpose, which is not feasible with the currently available resources, and therefore a smaller study area has to be defined. Since it is estimated that approximately 80% of the kiosks are located in Lviv downtown district(s), the study area will comprise downtown Lviv, and will be more specifically defined based on a preliminary assessment of the area by members of the research team. After the mapping of all kiosks in the study area, a random sample of these vending sites will be selected (the assessment of 20–30 is feasible with the available resources, but the final number will be defined depending on the total number identified in the study area). The study area for identification of kiosks will be centred on the Danylo Halytskyi monument, and will have a 500 m radius. This is expected to allow the identification of a large number of selling points in the central part of the city.

- **Fast-food outlets.** Google Maps searches only allowed the identification of one brand of food outlet, but there might be a wider variety of brands to identify in the field. Therefore, a comprehensive mapping of these vending sites in downtown Lviv will be carried out, as for kiosks. Then, only one fast-food establishment of each brand will be randomly selected, under the assumption that the composition of products from food outlets of the same brand is homogeneous across selling points. The study area will be the same defined for the identification of kiosks.

Step 3. Chemical analyses

Each individual sample will be photographed and weighted in order to report on portion sizes. All samples, solid and semi-solid, will be ground mechanically, homogenized and separated into four aliquots. The aliquots will be stored in individually labelled rigid plastic containers with covers and inside closed plastic bags. After preparation, each container will be stored in a freezer (at –18 °C) until chemical analysis. Samples will be thawed and analysed immediately.

All samples will be analysed in duplicate, and the analytical results will represent the mean of the two determinations, expressed in grams per 100 g of fresh food. Those values will be further computed into grams per serving, using the portion sizes collected. Individual fatty acid results, including total TFA, will be expressed in grams per 100 g total fatty acids.

FEEDcities in Lviv

Preliminary discussions among the research team responsible for designing and implementing the FEEDcities study in Lviv led to the decision that the food products collected will be assessed for their content in total fat and lipidic profile including TFA (primary focus), sodium and potassium, but other components of the proximate analysis (protein, total carbohydrates and fibre) may be assessed later.

For TFA analysis (the fatty acid profile) fat will be extracted using organic solvents, then converted to fatty acid methyl esters and separated by gas chromatography, as described in the WHO Simplified Protocol *(19)*. The analysis will be conducted by the laboratories where the capacity is installed and where the practical training on this specific method takes place, namely at the State Scientific Research Institute of Laboratory Diagnostics and Veterinary and Sanitary Expertise in Kyiv and at the Khmelnytskyi Regional State Laboratory of the SSUFSCP.

Sodium and potassium analyses will be performed, depending on the capacity installed at the selected laboratories, using an inductively coupled plasma optical emission spectrometer, after acid digestion in a closed-vessel microwave system, as described by Nascimento et al. (2014) *(20)* at the State Scientific Research Institute of Laboratory Diagnostics and Veterinary and Sanitary Expertise in Kyiv, or by atomic absorption or a flame photometer at the Khmelnytskyi Regional State Laboratory of the SSUFSCP.

For fatty acid analysis, Chernihiv Regional State Laboratory of the SSUFSCP and the Ternopil Regional State Laboratory of the SSUFSCP were held in reserve, however their capacity was not needed for this research.

Ethics and dissemination

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 food products to be applied in Ukraine, the WHO Country Office in Ukraine consulted the WHO Ethics Review Committee (ERC) Secretariat on 3 October 2023. The ERC Secretariat stated that that project did not require submission to the ERC as the research did not engage with human participants.

The only information to be collected and registered refers to the food offer. Data on the foods available for sale at different selling points will be obtained by direct observation. The food samples for chemical analysis will be bought by researchers as part of a normal transaction.

The findings of this assessment will be published on the WHO website as country reports, submitted for publication in international peer-reviewed journals, and presented at scientific meetings. The authors declare that they have no competing interests.

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АППАРАТ
ВСТРЯХИВАНИЯ
АВУ-6с
300
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Annex 1. Preliminary list of foods to be targeted in Lviv, Ukraine

Food	Vendor code(s)	Subtypes
Industrial food products		
Ready to eat (RTE)		
Chocolate/chocolate bars/chocolate candies	S	—
Non-chocolate candies	S	—
Prianyky (gingerbread with or without filling)	S	—
Cupcakes (muffins)	S	—
Doughnuts	S	—
Salty sticks	S	—
Wafers	S	—
Cakes	S	—
Cookies (shortbread)	S	—
Biscuit-sandwiches with cream or filling	S	—
Oatmeal cookies	S	—
Ice cream	S	—
Milk-based desserts	S	Blueberry cheesecake, strawberry with cream, tiramisu, cherry with chocolate glaze, strawberry, pistachio, green tea, three-layer cereal, pear, lime, almond-coconut praline
Potato Chips	S	—
Croutons	S	—
Not RTE		
Hard cheese	S	—
Processed cheese	S	—
Cheese product	S	—
Mayonnaise	S	—
Butter or spread/“butter product”	S	—
Margarine	S	—
Processed meat (sausage)	S	—
Frozen pizza	S	—
Frozen pies	S	—
Frozen croissants	S	—
Frozen *syrnyky* (cheese pancake)	S	—
Processed meat (cooked sausage)	S	—

Food	Vendor code(s)	Subtypes
Homemade foods		
French fries	K F	French fries, potato dips, country-style potatoes
Burgers	K F	Burger, cheeseburger, chicken burger, fish burger
Deep-fried cheese	K F	—
Pizza	K F	Margarita, pepperoni, ham and mushrooms, BBQ, four/five cheeses, Hawaiian
Doner	K F	Chicken, beef, lamb
Lyula kebab	K F	Chicken, beef, lamb, mix
Hotdog	K F	With milk sausage, smoked sausage or sausage with cheese
Panini (sandwich)	K F	With chicken, ham, salami, sausages, cheese
Salad with mayonnaise	K F	Olivier potato salad with crab sticks, mimosa
Cheesecake	K	Cheesecake without topping, chocolate, caramel, with berries
Cakes	K	Brownie, Prague, Napoleon, honeydew (*medovyk*), drunken cherry, Kyiv cake, apple charlotte, apple strudel
Croissants	K F	Croissant without filling, almond, pistachio, chocolate, with berries
Chicken nuggets	F	—
Crepes	K F	Fillings: chicken and mushrooms, liver, meat, red fish, condensed milk, poppy seeds, apple with cinnamon, cherry, cheese
Falafel	K F	—
Savoury pastry	K F	*Pyrizhky* with meat, cabbage, spinach, cheese, chicken, mushrooms, potatoes, peas; sausage in dough; *khachapuri*; pie with meat, cheese, spinach, cabbage
Sweet pastry	K F	*Pyrizhky* with cherries, apples, poppy seeds, jam; *vatryushka*; cherry pie, peach pie

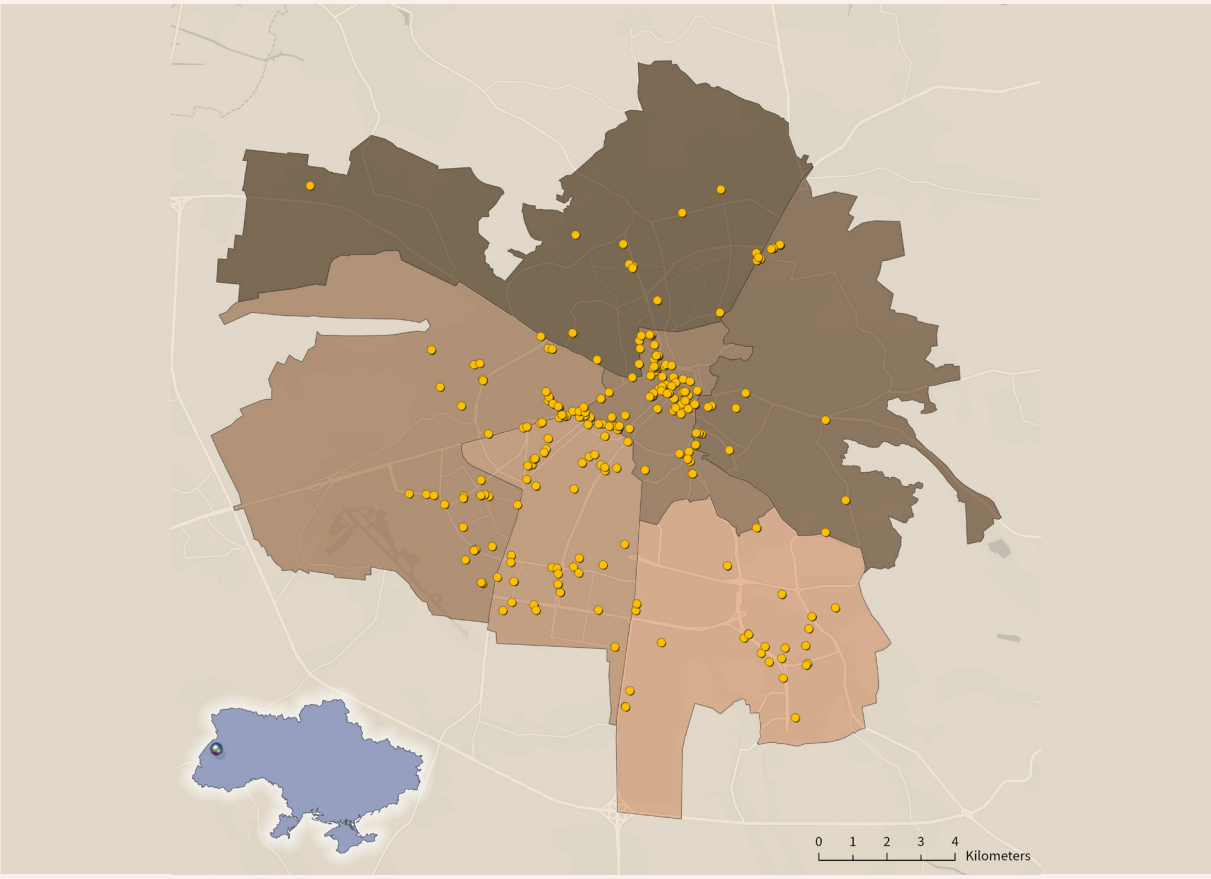
Notes: Vendor codes: F = fast-food outlet; K = kiosk; S = supermarket

Annex 2. General overview of fast-food outlets and supermarkets

Distribution of fast-food kiosks and restaurants

The distribution of fast-food kiosks and restaurants (Fig. A2.1) is based on all records where the vending site is listed as “fast food” or the name contains the word “kebab” in Ukrainian. While this search does not capture all fast-food outlets in the city, it provides an approximate view of their distribution.

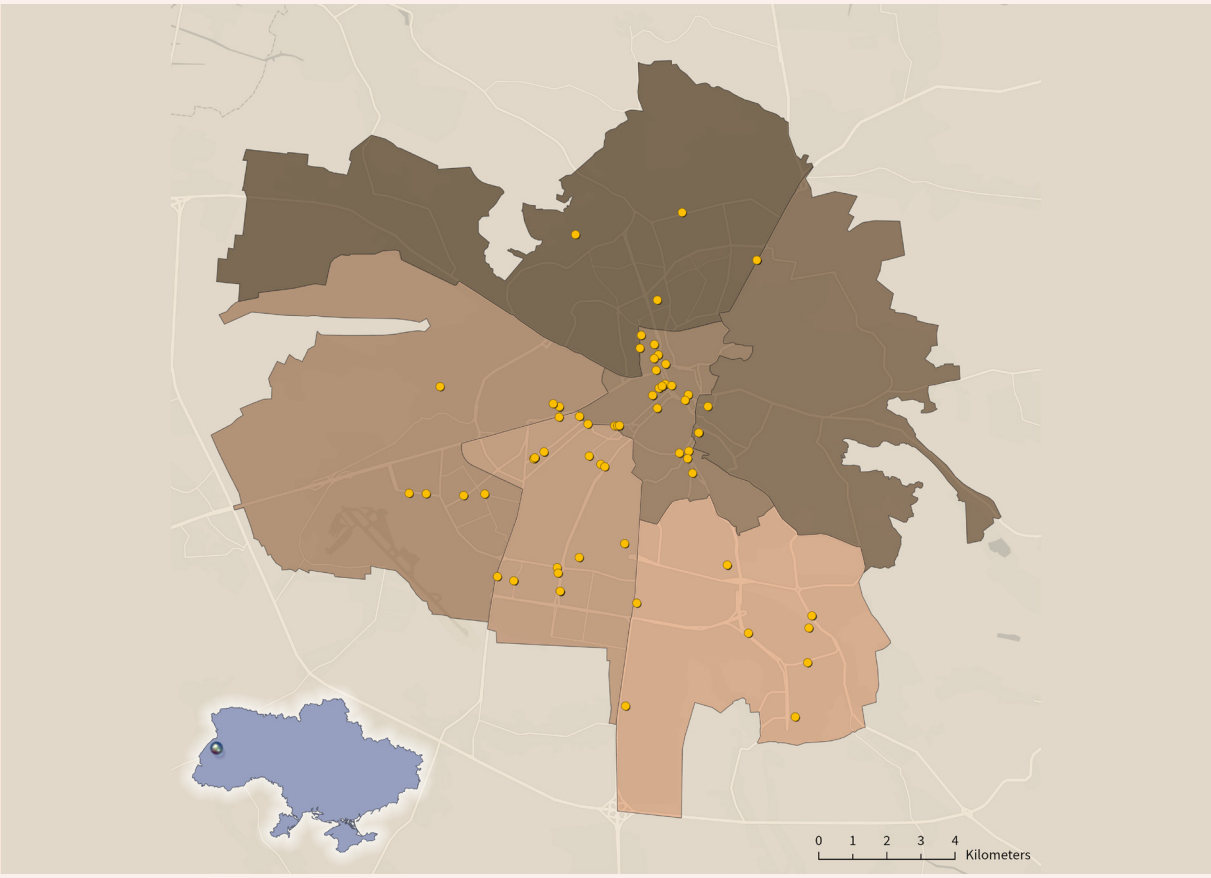
Fig A2.1. Distribution of fast-food kiosks and restaurants, Lviv



Data Source: Humanitarian Data Exchange (HDX) and the Humanitarian OpenStreetMap Team (HOT)

The distribution of outlets selling kebab (Fig. A2.2) is based on all records where the name of the vending site contains the word “kebab” (English) or “кебаб” (Ukranian). While this search does not capture all fast kebab outlets in the city, it provides an approximate view of their distribution.

Fig. A2.2. Distribution of kiosks selling kebabs, Lviv

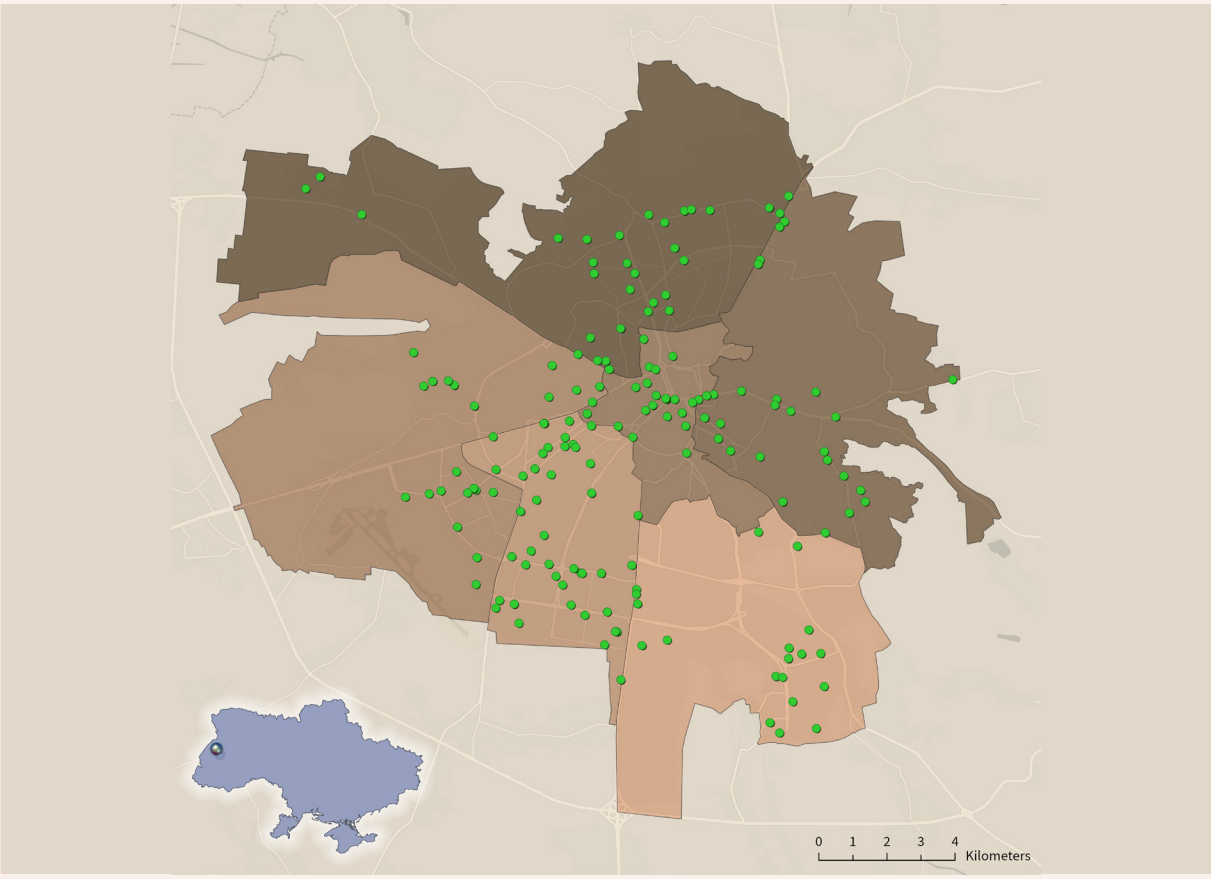


Data Source: Humanitarian Data Exchange (HDX) and the Humanitarian OpenStreetMap Team (HOT)

Distribution of supermarkets general overview

The distribution of supermarkets (Fig. A2.3) is based on all records where the facility type is listed as “supermarket”. While this search does not capture all supermarkets in the city, it provides an approximate view of their distribution.

Fig. A2.3. Distribution of supermarkets, Lviv



Data Source: Humanitarian Data Exchange (HDX) and the Humanitarian OpenStreetMap Team (HOT)

Based on the overall distribution, we can see that vending sites are mainly concentrated in the Halytskyi district, while supermarkets are distributed across the city. Halytskyi is the smallest district, and covers the central part of Lviv (the most popular area among tourists). Therefore it was decided to choose Halytskyi as the research site for restaurants and kiosks, while using the whole of Lviv as the site for large supermarkets.

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