



FEEDcities project

Food Environment Description in cities –
eastern Europe and central Asia
Banja Luka. The Republika Srpska.
Bosnia and Herzegovina



Technical report
February 2019



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Abstract

This technical report presents the results of a cross-sectional survey conducted in Banja Luka, the Republika Srpska, Bosnia and Herzegovina, between July and August 2017, as part of the FEEDcities Project (Food Environment Description in cities – eastern Europe and central Asia). The aim of the report is to describe the city's local street food and takeaway food environment, exploring the characteristics of food vending sites, the industrially produced and homemade foods they typically offer, and the nutritional composition of these foods. Finally, the report provides guidance on how to address its findings through policy action.

The study was conducted through a bilateral partnership between the World Health Organization (WHO) and the Institute of Public Health of the University of Porto, in collaboration with the Faculty of Medicine, the Faculty of Nutrition and Food Sciences, and the Faculty of Pharmacy of the University of Porto (WHO registration 2015/591370 and 2017/698514). The study was funded through a voluntary contribution of the Ministry of Health of the Russian Federation, and through a contribution made by the Swiss Agency for Development and Cooperation (SDC)/Swiss Government to a joint WHO/SDC project, "Reducing Health Risk Factors in Bosnia and Herzegovina: Developing and Advancing Modern and Sustainable Public Health Strategies, Capacities and Services to Improve Population Health", implemented in Bosnia and Herzegovina.

Keywords

STREET FOOD

TAKEAWAY FOOD

READY-TO-EAT FOOD

NUTRITIONAL COMPOSITION

TRANS-FATTY ACIDS

SODIUM

POTASSIUM

FOOD ANALYSIS

BOSNIA AND HERZEGOVINA

THE REPUBLIKA SRPSKA

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Abbreviations

FAO	Food and Agriculture Organization of the United Nations
NCD	noncommunicable disease
TFA	<i>trans</i> -fatty acid
WHO	World Health Organization

Executive summary

The current report gives an overview of the food context in urban Banja Luka, the largest city in the Republika Srpska, Bosnia and Herzegovina, using a standardized methodology. Some aspects of the urban food environment revealed by the study are positive, while other are cause for concern; the latter indicate that stronger policy action is needed in this area in order to improve public health.

The Food and Agriculture Organization of the United Nations (FAO) and the World Health Organization (WHO) define street food as “ready-to-eat foods and beverages prepared and/or sold by vendors and hawkers especially in streets and other similar places”. In many settings, especially in urban areas of low- and middle-income countries, street food is diverse and constitutes a widely accessible and inexpensive food source. However, it often includes energy-dense foods rich in fat, sugar and sodium. Previous research on street food has focused mainly on food safety, paying little attention to its contribution to the diet of the population. Furthermore, little or no research has been conducted in the WHO European Region.

The main objective of the FEEDcities Project is to characterize the street food environment in cities in eastern Europe and central Asia. The study provides information that supports some of the objectives of the WHO European Food and Nutrition Action Plan 2015–2020, such as creating healthy food and drink environments and increasing surveillance, monitoring, evaluation and research. This report describes the characteristics of vending sites; the ready-to-eat food they offer; and the nutritional composition (specifically, *trans*-fatty acids (TFA), sodium and potassium content) of the street foods and takeaway foods – typically, from bakeries and outlets selling savoury pies and barbecued foods – that are most commonly available in Banja Luka. The findings and conclusions of this study will contribute to implementation of health strategies set out in existing health programmes in the Republika Srpska, and particularly to the design and implementation of population-based interventions to reduce TFA and sodium intake.

Between July and August 2017, eligible street food and takeaway food vending sites were identified by means of random and systematic sampling procedures. These sites were situated in and around the main city market (Gradska tržnica) in Centar 1 (the principal city community), and around 10 bus stops; both urban and other areas of Banja Luka were thereby included. Vending sites selling only unprepared fresh fruit were not included in the study. A total of 125 eligible food vendors (street food: 69; takeaway food: 56) were interviewed to ascertain the characteristics of their vending sites and the types of ready-to-eat foods and beverages sold. Following this assessment, random and systematic sampling was then used to select vending sites from which the foods most commonly available in these settings could be sampled. A total of 120 food samples (40 street food and 80 takeaway food) were collected; these represented four samples of each of the 30 most commonly available foods – 20 homemade (cooked and/or prepared at home or on the street) and 10 industrial (produced by the food industry).

In order to characterize the street foods and takeaway foods offered, products were grouped as fruit (fresh or dried), beverages (any drink, alcoholic or non-alcoholic), and foods other than fruit. Foods other than fruit and beverages were

divided into homemade and industrial. Unprocessed fruit (i.e. in its natural state) and vegetables were not sampled for analysis as their composition is already known in the literature.

The vendors interviewed were mostly women (92.8%) and employees of the business (92.8%). The majority of the establishments identified were street food vending sites (55.2%), all of which were stationary. The most prevalent street food vending site setup was the kiosk (86.4%), followed by establishments selling food or beverages through a window (5.1%). Bakeries were the commonest takeaway food vending site (26.4%). Generally, food was sold seven days a week (80.0% of all food vending sites) and during all four seasons (96.0% of all food vending sites). Street food vendors reported, additionally, that vending activity occurred regardless of the weather (94.2%).

A wide variety of homemade and industrial foods were sold within this urban food environment, demonstrating a rich street food culture. Foods other than fruit were available at all street food and takeaway food vending sites, and beverages were available at 94.4% (street food: 91.3%; takeaway food: 98.2%). Foods other than fruit were mostly only industrial (all: 43.0%; street food: 78.3%; takeaway food: 0.0%) or only homemade (all: 42.4%; street food: 18.8%; takeaway food: 71.4%). Vending sites selling both homemade and industrial foods represented a smaller proportion of the sample (all: 14.4%; street food: 2.9%; takeaway food: 28.6%). Soft drinks were available at 94.9% of sites selling beverages; water at 92.4%; and fruit juice-based drinks at 83.9%. A high proportion of alcoholic (50.9%), traditional (50.0%) and energy drinks (49.2%) were also found. Fruit was not available within this urban food environment.

The foods analysed frequently contained high levels of TFA and sodium; this was particularly so in the case of homemade foods. The mean TFA content per serving was highest for homemade cake (2.32 g), homemade *ćevapi* (1.71 g), and homemade cheese puff pastry (1.50 g), corresponding to 104.8%, 76.9% and 67.7%, respectively, of the recommended maximum daily intake of TFA (based on a reference daily intake of 2000 kcal for an average adult). The highest mean sodium content per serving was observed in sausage barbecue (2232 mg), *ćevapi* (2140 mg), and meat savoury pie (2079 mg), corresponding to 111.6%, 107.0% and 103.9%, respectively, of the recommended maximum daily intake. The mean potassium content per serving was also highest in homemade sausage barbecue (782 mg), *ćevapi* (536 mg), and meat savoury pie (390 mg), corresponding to 22.3%, 15.3% and 11.1%, respectively, of the recommended daily minimum intake for potassium.

These results demonstrate high levels of salt and *trans* fats in homemade foods sold in the urban environment of Banja Luka. The highest TFA content was found in homemade main dishes and pastries sold in takeaway food establishments; this suggests widespread use of cooking fats and shortenings containing TFA in the preparation and manufacture of foods. Widely diverse foods were found to be rich in sodium, including homemade traditional main dishes, and in some cases their sodium content per serving exceeded the recommended maximum daily intake for this nutrient.

Although street vending sites that sold only fruit or vegetables (e.g. market stalls) were excluded from the study, ready-to-eat fresh fruit was absent from eligible street and takeaway food vending sites in Banja Luka. Greater availability would ensure that urban residents had easier and more convenient access to such foods as an essential part of a healthy diet. The wide availability of sugary and alcoholic drinks is a concern in light of the increasing rates of obesity and other noncommunicable diseases (NCDs) in the country.

The types of food and beverage offered in the streets of Banja Luka, as well as the nutritional composition of the most common foods, indicate that the nutritional quality of ready-to-eat food available in the city should be improved. It will be important, however, to preserve the cultural and community role of food vendors in sustaining traditional foods and providing access to whole foods, such as fruit and vegetables. There are various practical policy options available to ensure a healthier urban food environment; these should be integrated into existing policies in the Republika Srpska.

Reducing the salt content of ready-to-eat foods sold in both street food and takeaway food vending sites is likely to require a multipronged approach. One such initiative will be health promotion to convince street food vendors and small producers to use less salt; another will be to raise awareness among the public about the high salt content of such foods and the health effects of excess consumption. Another, increasingly important component of changing the food context is adoption

of targets for reducing salt in industrially produced food (e.g. savoury snacks). Policies to help achieve these targets could include setting maximum limits for salt in specific food categories through regulation, which would apply to all foods on the market, including in takeaway food establishments, to ensure non-discrimination. Nutritional information on packaged foods in the country could be improved to ensure that all packages bear a nutrient declaration (including sodium) in addition to an ingredients list.

Cooking fats and pastry shortening containing TFA are widely used in food preparation. Legislation targeted directly at producers of industrial fats and manufactured foods, prohibiting use of hydrogenated fats and oils in food production, is recommended; in this regard, a maximum limit of 2 g *trans* fat per 100 g of total fat might be appropriate. Encouraging producers such as bakers and vendors to use healthier fats and oils in their recipes is one practical policy option to facilitate the move towards a healthier urban food environment.

This study shows that there is considerable scope for improving the nutritional adequacy of street and takeaway foods available in Banja Luka. It also underlines the need for health policies targeted at enhancing public awareness and improving the nutritional quality of such foods and beverages – while protecting their cultural and community role – in order to reduce the occurrence of diet-related NCDs in the country.



1. Introduction

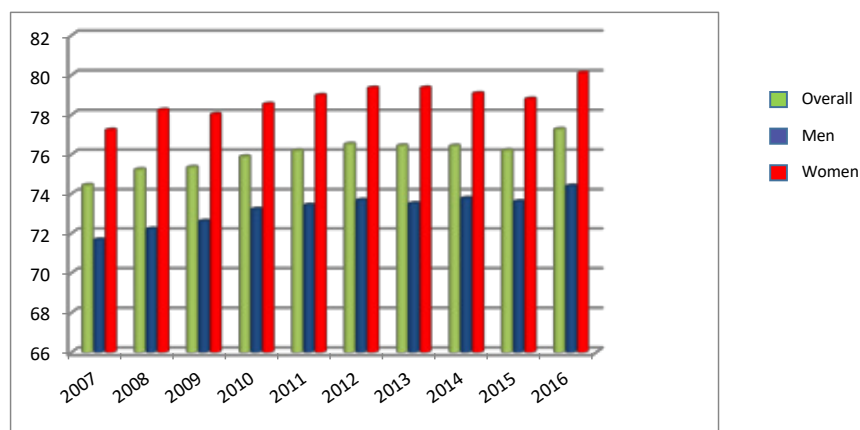
According to the Constitution of Bosnia and Herzegovina, which is an integral part of the General Framework Agreement for Peace in Bosnia and Herzegovina (1), Bosnia and Herzegovina consists of two entities: the Federation of Bosnia and Herzegovina and the Republika Srpska (as well as a third administrative unit, Brčko District). The responsibilities of Bosnia and Herzegovina, stipulated in Article III of the Constitution, are as follows: foreign policy; foreign trade policy; customs policies; monetary policy as provided in Article VII; financing institutions and international obligations; policy and regulations for immigration, refugees and asylum; implementation of international and inter-entity criminal law enforcement, including relations with Interpol; establishment and operation of common and international communications means; regulation of traffic between entities; and air traffic control (1).

Bosnia and Herzegovina is an upper-middle-income country, with an annual gross domestic product (GDP) of US\$ 16.9 billion and an annual growth rate of 3.0% (2). The poverty rate in Bosnia and Herzegovina (measured as the threshold at which a person's minimum nutritional, clothing and shelter needs are met (2)) fell slightly from 17.9% in 2011 to 16.9% in 2015.

According to its constitution (3), the Republika Srpska is a unitary and indivisible constitutional and legal entity that independently performs its constitutional, legislative, executive and judicial functions. All governmental functions and powers belong to the Republika Srpska, except those that the Constitution of Bosnia and Herzegovina explicitly transferred to its institutions. The Republika Srpska comprises approximately 1.2 million people (4). Its largest city is Banja Luka, which has a population of almost 183 000; the city is also the administrative, economic and cultural centre (5).

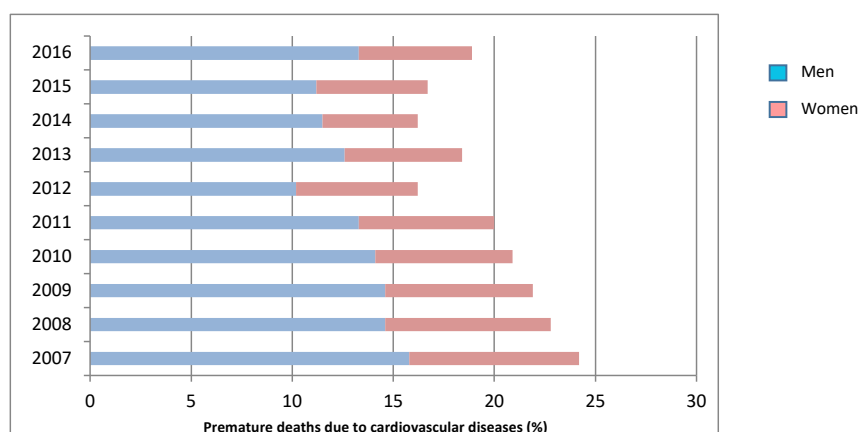
According to the Republika Srpska Institute of Statistics, in 1998 life expectancy at birth for the population of the Republika Srpska was 72.61 years (75.37 years for women; 69.86 years for men). In the 10-year period between 2007 and 2016, life expectancy at birth increased overall and by gender, so that women still live about six years longer than men on average (Fig. 1) (6).

Fig. 1. Life expectancy at birth, the Republika Srpska, Bosnia and Herzegovina, 2007–2016



The leading causes of death in the Republika Srpska in 2016 included cardiovascular diseases (49.5%) and malignant neoplasms (21.1%), which together accounted for more than half of all deaths (70.6%). The upward trend in cardiovascular diseases over the observed period seems to have reversed or plateaued, while gender differences in mortality remained at the same level (Fig. 2) (6).

Fig. 2. Percentage of premature deaths (between ages 30 and 70 years) in the Republika Srpska due to cardiovascular diseases, 2007–2016



Some countries in the WHO European Region have experienced a nutritional transition in recent decades, reflecting growing urbanization and globalization of the processed food supply chain (7). Associated dietary changes include a decrease in consumption of foods rich in fibre, such as legumes, fruits, vegetables and whole grains, and more frequent intake of processed foods, which are likely to be energy-dense and rich in fats, sugar and salt (8), and which are known to be associated with weight gain and greater frequency of NCDs. In particular, there is consistent evidence showing that industrially produced *trans*-fatty acids (TFA) and sodium contribute to an increased risk of cardiovascular diseases (9). WHO advocates complete elimination of TFA from the global food supply (9), and several public authorities have started to effectively ban or regulate their use (10). In addition, WHO calls for significant reduction in sodium intake (11). Most of the dietary intake of sodium comes either from addition of salt during preparation and cooking of food or from processed foods, and salt reduction efforts focus on three main pillars: product reformulation; public awareness; and rules for clear nutrition labelling (11). WHO recommends no more than 2000 mg of sodium per day, corresponding to 5 g of salt (sodium chloride) per day, among the adult population, in order to reduce blood pressure and risk of cardiovascular disease (12). Nevertheless, in most countries where recent data are available, sodium intake is much higher than this (13). According to data from the Global Burden of Diseases Nutrition and Chronic Diseases Expert Group (NutriCoDE), in Bosnia and Herzegovina the estimated sodium intake in adults (aged 20 years and over) was 3460 mg/day in 2010 (14). Potassium, another key nutrient, is inversely associated with blood pressure; WHO recommends a minimum daily intake of 3510 mg in order to reduce the risk of cardiovascular disease (15).

The Ministry of Health and Social Welfare of the Republika Srpska has developed the Policy for Improvement of Health of the Population in the Republic of Srpska by the Year 2020 (16). One course of action that is prioritized in this policy document is prevention and control of NCDs, to be achieved by implementing the recommendations of various international initiatives: the Political Declaration of the High-Level Meeting of the [United Nations] General Assembly on the Prevention and Control of Noncommunicable Diseases; the WHO Global Strategy on Diet, Physical Activity and Health; and WHO's Gaining Health – European Strategy for the Prevention and Control of Noncommunicable Diseases. These programmes include initiatives aimed at promoting healthy diets and increasing physical activity, as well as reducing salt, sugar and saturated fats and eliminating industrially produced *trans* fats in foods. In light of these measures, it is clear that food and nutrition, as well as prevention and control of NCDs, are firmly on the agenda of public health policy discussion in the Republika Srpska.

Street food context in Banja Luka

The Food and Agriculture Organization (FAO) 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” (17). Street food can be an important component of the daily diet (18), representing a cultural, social and economic phenomenon that is typical of urbanized areas, where the lifestyle is becoming more sedentary and the time dedicated to cooking at home is dramatically reduced (19). It also plays an important community role, giving access to high-fibre foods rich in micronutrients (fruits and vegetables) and protecting traditional food/diet habits.

On the other hand, foods purchased from street vendors may significantly contribute to excess energy and nutrient intake. This aspect has been understudied (20) – more attention should be given to the nutritional quality of foods available from street vendors and markets. Furthermore, the expansion of takeaway outlets in urban settings has led to important changes in the food supply and in food purchasing patterns, with consequent dietary changes. This underlines the importance of characterizing and monitoring the types of ready-to-eat foods that are offered and purchased, in the context of efforts to prevent NCDs. Nevertheless, research in low- and middle-income countries has focused mostly on issues linked to hygiene and food security (20), and little is known about the nutritional characteristics of street food.

In Banja Luka, unlike other settings where research on street food has been conducted, it was observed, during a preliminary field visit, that most food products available for consumption in the streets are not sold in traditional street food vending sites (as normally defined). The majority of food vending sites in Banja Luka are formal establishments (mostly bakeries, fast-food shops and kiosks), where customers are required to enter the premises in order to purchase ready-to-eat, takeaway foods that are displayed on a counter. Other vending sites sell directly to the street via a window or counter. While vending sites are found throughout the city, they are concentrated in the centre. A large proportion of food purchasers, including tourists, were found in the city centre, while a smaller proportion, mostly locals, were found in the outskirts, in vending places located near bus termini. The most commonly available foods were fast food and other ready-to-eat varieties, including savoury pastries, tortilla, breads, sandwiches, biscuits (cookies) and cakes, pizza, industrial snacks and sweets, yoghurt and homemade drinks. Accordingly, the study methodology was adapted to the local context and included both street food in the classical sense and ready-to-eat food sold in takeaway vending sites.

2. Objectives

The aim of this study is to characterize the food environment of urban Banja Luka. The specific objectives addressed are as follows:

- to describe the characteristics of the city’s street food and takeaway food vending sites;
- to characterize the food offered at selected vending sites;
- to assess the nutritional composition of ready-to-eat foods (other than fruits) sold in street and takeaway food vending sites – specifically, with respect to their sodium, potassium and TFA content.

3. Methods

A cross-sectional evaluation of street food and takeaway food vending sites was conducted in Banja Luka between 3 July and 17 August 2017. The study protocol was developed by the University of Porto in collaboration with the WHO Regional Office for Europe and was approved by the Ethics Committee of the Institute of Public Health of the University of Porto.

WHO Regional Office staff and consultants carried out recruitment and training of local field researchers (interviewers); the session was held over a six-day period and attended by 10 interviewers. The training included lectures, demonstrations, and practice interviews involving pre-testing of the data collection forms; this was conducted both in the office and in a pilot study carried out in one of the city markets that had not been selected for the study.

Eligibility criteria

Street food vending sites

We adopted the definition of street food proposed by FAO and WHO: “ready-to-eat foods and beverages prepared and/or sold by vendors or hawkers especially in the streets and other similar places” (17). This definition includes products that have been prepared in advance (e.g. sandwiches, salads) or cooked (e.g. boiled eggs, traditional dishes), as well as raw foods that are sold for immediate consumption (e.g. fruits, nuts), even though these products may sometimes be bought to be consumed later (e.g. at home or at work).

Regarding physical setup, eligible vending sites are those that sell ready-to-eat food, including beverages and/or snacks, from any venue other than a permanent storefront business or an establishment with four permanent walls, operating in a predefined perimeter, that does not sell directly on the street. The definition includes “street hawkers”, or mobile vendors, as well as sellers with semi-static or stationary vending units. Vending sites selling only unprepared fresh fruit were not eligible, as much of the produce bought at such sites is for household consumption and so does not meet the definition of “ready-to-eat” food.

Takeaway food vending sites

To give a better representation of the food offer in Banja Luka, specific takeaway food establishments were also included in the study sample, taking into account observations of the urban food environment made during the field visit. The definition of a takeaway food vending site proposed by the United Kingdom authorities in their town and country planning regulations was adopted for this study: “an outlet whose primary business is the sale of ready-to-eat food and beverages for consumption off the premises” (21). The definition includes vending sites where ready-to-eat foods and beverages are ordered and paid for at the till, where there is limited space for sitting in or out, and where no waiter service is available. Such sites include:

- bakeries;
- takeaway food restaurants selling savoury pies (*buregdžinica*);
- takeaway food restaurants selling barbecue (*ćevabdžinica*).

Cafés, full-service restaurants, drinking establishments and shops were ineligible, as were takeaway food franchises.

Sampling of vending sites

Following the field visit, our final assessment was that eligible vending sites were widespread throughout the city, with a higher density in the City Market (Gradska tržnica) and its surroundings and, to a lesser degree, near bus termini. Our sampling procedure started, therefore, with selection of the main city market and 10 bus stops/termini, each of which was the main station of the city bus routes. The selected market (Gradska tržnica) was located in the main urban community (Centar 1); the bus stops in 10 other communities (Paprikovac, Petrićevac, Lazarevo, Malta, Rosulje, Srpske toplice, Lauš, Borik, Vrbanja, Starčevica).

For the City Market (Gradska tržnica), we defined a buffer of 1500 m in diameter around its centre point, to represent the study area. For the bus stops, the buffer diameter was 100 m. The study areas were evaluated on consecutive days, from first to last as listed in Table 1. Field researchers, operating in pairs, canvassed each study area in search of eligible food vending sites, walking through any publicly accessible street in the selected area. Selected bus stops that were found to have no vending sites within the defined buffer were replaced by ones that were nearby and, preferably, in the same city community (Table 1).

Table 1. Selected study areas in Banja Luka

Market/Bus stop	City community
City Market (Gradska tržnica)	Centar 1
Nova bolnica (bus stop)	Paprikovac
Petrićevac crkva (bus stop)	Petrićevac
Kasarna Kozara (bus stop)	Lazarevo 1
Malta (bus stop) ^a	Rosulje
Crvene zgrade (bus stop)	Rosulje
Srpske toplice (bus stop)	Srpske toplice
Jadranka (bus stop)	Lauš 1
Borik (bus stop)	Borik 1
Vrbanja (bus stop) ^b	Vrbanja
Stračevica BS5 (bus stop)	Starčevica

^a Selected to replace the Kalvan bus stop (Nova varoš community), originally selected but where no vending sites within the defined buffer were found.

^b Selected to replace the Medeno polje bus stop (Ada community), originally selected but where no vending sites within the defined buffer were found.

After recording the GPS coordinates of each vending site (using a GPS system incorporated in the tablets used for data collection), the field researchers approached the vendors to explain the study objectives and procedures and to request their general consent to participate in data collection. When the vendor agreed, the interviewers conducted the structured questionnaire (lasting approximately 10 minutes) on their food vending activity and the foods they offered. Of a total of 135 eligible food vendors approached, 125 (92.6%) agreed to participate (n = 69 street food vendors; n = 56 takeaway food vendors).

In order to avoid interviewing the same vendor twice and to facilitate recognition of which vendors had already been approached, a sticker with the research project logo was attached (with the vendor's permission) to the vending site at the end of the interview. The field researchers were instructed to answer any questions that vendors might have regarding the purpose of the study.

Characterization of vending sites and foods offered

Direct observation was used to categorize vending sites by type, either as “takeaway” or “street food”; street food vending sites were further classified (again, by direct observation) according to their mobility (stationary or mobile) and their physical setup (stand, kiosk, push cart, freezer/cooler, etc.).

Face-to-face interviews with participating vendors were used to collect information on their status (e.g. sex, ownership) and details of their business activity (working days, number of employees, access to clean water and electricity, etc.).

Data on ready-to-eat foods offered (e.g. type of food products available, servings, preparation and packaging) were also collected. Types of food available were grouped as follows:

- fruit: product in its natural (unprocessed) form, either fresh or dry;
- beverages: any alcoholic and non-alcoholic drinks;
- all foods other than fruit.

This last category was further classified as homemade (foods cooked and/or prepared at home or on the street, even if industrially produced ingredients are used) or industrial (food products produced by the food industry sold without any further preparation). Beverages were classified as soft drinks, water, fruit juice-based drinks, fresh fruit juice, milk, alcoholic drinks, energy drinks, coffee, tea and traditional beverages.

Selection, collection and analysis of food samples

After the vending sites had been characterized with respect to the food they offer, the 20 most frequently available homemade foods and the 10 most frequently available industrial foods were selected from street food and takeaway food vending sites for bromatological analysis. Common drinks with known nutritional composition, such as coffee, tea, milk and soft drinks, were not eligible for bromatological analysis. A total of 120 samples (40 from street food vending sites and 80 from takeaway food vending sites) were collected, corresponding to four different samples of each of the 30 foods previously identified. The food samples collected represented one unit, or a single “serving”, as normally sold. For any type of food sold in small portions (such as snacks or biscuits), each sample included several units, according to the usual purchasing/consumption pattern. Examples of each of the 30 food samples are shown in the annexes at the end of this report.

For sampling purposes, the selected homemade foods were grouped in five sets (A, B, C, D and E) of four foods, while industrial foods were grouped in five sets (F, G, H, I and J) of two foods, each one collected in four different vending sites (Table 2).

Table 2. Definition of food sample sets

Homemade food	Set	Industrial food	Set
1	A	1	F
2		2	
3		3	G
4		4	
5	B	5	H
6		6	
7		7	I
8		8	
9	C	9	J
10		10	
11			
12			
13	D		
14			
15			
16			
17	E		
18			
19			
20			

For six consecutive days (including weekends), food samples from three sets of homemade and three sets of industrial foods were collected; on the seventh day, two sets of homemade and two sets of industrial foods were collected (Table 3). On each day, approximately 12–18 samples of different foods were collected, until 120 samples had been gathered.

Table 3. Framework for random sampling of food products

Day	Market or bus stop	Homemade samples			Industrial samples		
1	City Market (Gradska tržnica)	A	B	C	F	G	H
2	Nova bolnica, Petrićevac crkva, Kasarna Kozara, Malta, Crvene zgrade (bus stops)	D	E	A	I	J	F
3	City Market (Gradska tržnica)	B	C	D	G	H	I
4	Srpske toplice, Jadranka, Borik, Vrbanja, Stračevica BS5 (bus stops)	E	A	B	J	F	G
5	City Market (Gradska tržnica)	C	D	E	H	I	J
6	City Market (Gradska tržnica)	A	B	C	F	G	H
7	City Market (Gradska tržnica)	D	E		I	J	

As some of the selected foods are characteristic of specific types of vending site, the areas to canvass each day were determined on the basis of the number and type of establishments (street food vending site; bakery; *buregdžinica*, “pie place”; or *ćevabdžinica*, “barbecue place”) per market or bus stop previously identified, in adjacent geographical areas (Table 3). The selection of vending sites where food samples were to be collected was carried out by random route procedures, according to the number of each type of vending site selling the foods assigned for the day, starting with the random selection of GPS coordinates within each of the study areas.

The selected GPS coordinates were used as the starting point for a systematic selection procedure in which field researchers would move north, then east, continuing south and west to the limits of the study area or a physical barrier (such as a wall or a canal), until they reached vending sites at which the selected foods were available. In each market, on each collection day, only one food sample was obtained from the same vendor, with the most common foods being selected first.

Solid and semi-solid food samples were first subjected to mechanical grinding. Then, four representative aliquots of each sample were homogenized, weighed and packed individually in labelled rigid plastic containers. After packaging, each container was weighed again and stored in a freezer (at –18 °C) until bromatological analysis was conducted.

Before the analyse, samples were defrosted, weighed again (to detect moisture loss during storage and shipping), homogenized, and immediately analysed for moisture. Bromatological analysis comprised determination of TFA, sodium and potassium content. For TFA analysis, the fat fraction was extracted from the food by means of organic solvents; then a portion was converted to fatty acid methyl esters, as described elsewhere (22), and separated by gas chromatography. Sodium and potassium analysis was performed by an inductively coupled plasma optical emission spectrometer (ICP-OES), as described by Nascimento et al. (23).

Statistical analysis

The street food environment is characterized, overall and across the two settings – city centre (main city market) and other areas (10 bus stops) – using descriptive statistics. Locations of the vending sites are mapped and descriptions of their characteristics and the food they offer are presented as proportions.

The nutritional composition of each food is presented as the mean and range of TFA, sodium and potassium per serving, and as the mean contribution to the daily recommended intake of each nutrient. Mean serving sizes, calculated as the mean of the individual portions/doses collected for each food, are also presented.

4. Results

Distribution of the selected market, bus stops and vending sites

Fig. 3 shows the distribution of the selected study areas and food vending sites in Banja Luka. As the map shows, these areas were scattered throughout the city.

Fig. 4 shows the 1500 m diameter buffer around the City Market (Gradska tržnica). The vending sites identified in this study area (Centar 1) were mainly concentrated in the proximity of the market, resembling in this respect the distribution of the vending sites in the other study areas. As was anticipated, this study area included a higher density and variety of eligible vending sites than the other selected areas.

Fig. 3. Selected market, bus stops, and food vending sites in Banja Luka

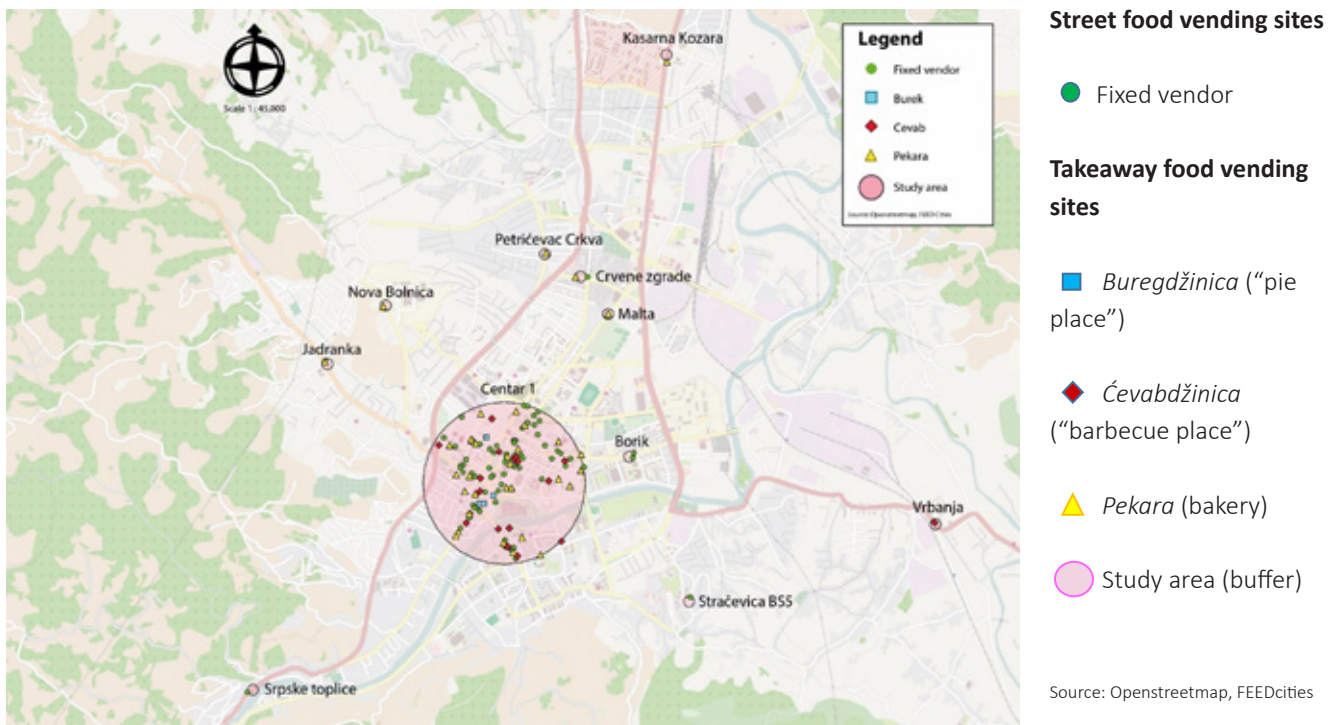


Fig. 4. The Centar 1 buffer, including the City Market (Gradska tržnica) and food vending sites that were evaluated



Characteristics of vendors and vending sites

The characteristics of street food and takeaway food vendors are summarized in Table 4. Most vendors were women (92.8%) and employees of the business (92.8%). Street food vending sites were the most common type of establishment (55.2%); all were stationary. Among takeaway food vending sites, bakeries were the most prevalent (26.4%). The results were generally similar across both settings (Centar 1 and other locations), except that bakeries were more prevalent in areas outside Centar 1 (42.9%) than they were within it (24.3%).



Table 4. Characteristics of street food and takeaway food vendors and vending sites in Banja Luka, overall and by setting

	Total (n=125)	Setting	
		Centar 1 (City Market) (n=111)	Other areas (bus stops) (n=14)
Sex (%)			
Women	92.8	92.8	92.9
Men	7.2	7.2	7.1
Type of establishment (%)			
Street food vending sites	55.2	55.9	50.0
Takeaway food vending sites	44.8	44.1	50.0
Buregdžinica ("pie place")	3.2	3.6	0.0
Ćevabdžinica ("barbecue place")	15.2	16.2	7.1
Pekara (bakery)	26.4	24.3	42.9
Owner (%)			
Yes	7.2	7.2	7.1
No	92.8	92.8	92.9

The different types of physical setup of street food vending sites (n=59) observed in Banja Luka are set out in Table 5. The most prevalent types were the kiosk (86.4%), present in both settings, followed by establishments selling food or beverages through a window (5.1%), which were found only in areas outside Centar 1. Other setups identified included stands (3.4%), ice-cream or lemonade freezers (3.4%) and push carts (1.7%).

Table 5. Physical setup of street food vending sites in Banja Luka, overall and by setting

	Total (n=59)	Setting	
		Centar 1 (City Market) (n=53)	Other areas (bus stops) (n=6)
Physical setup (%)			
Kiosk	86.4	92.5	33.3
Through window ^a	5.1	0.0	50.0
Stand	3.4	1.9	16.7
Ice-cream or lemonade freezer	3.4	3.8	0.0
Push cart	1.7	1.9	0.0

^a Restaurant selling fast food directly onto the street through an open window.

The majority of street food and takeaway food vendors had access to a toilet (total: 64.8%; street food: 37.7%; takeaway food: 98.2%) and to clean water (total: 68.8%; street food: 43.5%; takeaway food: 100.0%). When vendors were asked where they usually washed their hands during the work day, the most frequent answers were “toilet” (total: 49.6%; street food: 14.5%; takeaway food: 92.9%); “nearby establishment or public toilet” (total: 47.2%; street food: 84.1%; takeaway food: 1.8%); and “basin” (total: 37.6%; street food: 7.3%; takeaway food: 75.0%). One street food vendor reported that there was no place to wash hands. In addition, access to electricity was reported by 97.1% of street food vendors.

For most street food and takeaway food vendors, vending activity occurred during the whole week (total: 80.0%; street food: 91.3%; takeaway food: 63.1%) and in all four seasons of the year (total: 96.0%; street food: 95.7%; takeaway food: 96.4%). Street food vendors reported, additionally, that vending activity occurred regardless of the weather (94.2%).

Characteristics of the foods offered

Regarding the foods offered in Banja Luka (Table 6), fruit was not available. Beverages were available in 94.4% of vending sites, and foods other than fruit in all vending sites. Most street food and takeaway food vending sites sold only industrial (43.2%) or only homemade (42.4%) foods. Both homemade and industrial foods were available in a smaller proportion of vending sites (14.4%). Street food vending sites mostly sold only industrial foods (78.3%), while takeaway food vending sites mostly sold only homemade foods (71.4%) (Table 6).

Table 6. Food offer at street food and takeaway food vending sites in Banja Luka, overall, by setting and by type of establishment

	Total (n=125)	Setting		Type of establishment	
		Centar 1 (City Market) (n=111)	Other areas (bus stops) (n=14)	Street food (n=69)	Takeaway food (n=56)
Food offer (%)					
Fruit	0.0	0.0	0.0	0.0	0.0
Foods other than fruit	100.0	100.0	100.0	100.0	100.0
Industrial	43.2	46.0	21.4	78.3	0.0
Homemade	42.4	42.3	42.9	18.8	71.4
Homemade and industrial	14.4	11.7	35.7	2.9	28.6
Beverages	94.4	95.5	85.7	91.3	98.2

The most common homemade foods sold in the streets of Banja Luka were savoury pies (59.2%), bread (56.3%), ready-made sandwiches (52.1%) and sweet pies (52.1%). Table 7 shows the main characteristics of these foods with respect to their preparation, packaging and storage temperature. All of them were prepared on the same day, with the exception of some sweet pies (5.9%) and sandwiches (2.7%) that were prepared one day before, and some breads (2.5%) prepared two days before. Overall, these foods were prepared mainly at the vending site (ranging from 52.5% for bread to 90.5% for savoury pies). A smaller proportion of these products were produced at a central bakery (bread: 45.0%; sweet pies: 26.5%; sandwiches: 10.8%; savoury pies: 9.5%) or bought from another vendor (sweet pies: 2.9%; bread: 2.5%). All vending sites sold foods that were mostly prepared by employees (ranging from 97.5% for bread to 100% for savoury pies, sandwiches and sweet pies) and mostly packaged by hand (ranging from 91.9% for sandwiches to 100.0% for savoury pies). Sandwiches and sweet pies were mainly stored at cold temperature (81.1% and 58.8%, respectively); savoury pies mainly at warm temperature (73.8%); and bread at room temperature (100.0%).

Table 7. Detailed characteristics of a subsample of homemade foods most commonly offered at street food and takeaway food vending sites in Banja Luka

	Savoury pie ^a (n=42)	Bread ^b (n=40)	Sandwich ^c (n=37)	Sweet pie ^d (n=34)
Date of preparation, n (%)				
Same day	42 (100.0)	39 (97.5)	36 (97.3)	32 (94.1)
One day before	–	–	1 (2.7)	2 (5.9)
Two days before	–	1 (2.5)	–	–
More than two days before	–	–	–	–
Place of preparation, n (%)				
At home	–	–	–	–
At vending site	38 (90.5)	21 (52.5)	33 (89.2)	24 (70.6)
Both (at home and at vending site)	–	–	–	–
Bought from another vendor/store	–	1 (2.5)	–	1 (2.9)
Restaurant/cafeteria	–	–	–	–
Central bakery	4 (9.5)	18 (45.0)	4 (10.8)	9 (26.5)
Food handler (preparation), n (%)				
Employee	42 (100.0)	39 (97.5)	37 (100.0)	34 (100.0)
Owner	–	–	–	–
Relative	–	–	–	–
Not known	–	1 (2.5)	–	–
Packaging, n (%)				
Industrially packaged	–	3 (7.5)	3 (8.1)	1 (2.9)
Manually packaged	42 (100.0)	37 (92.5)	34 (91.9)	33 (97.1)
No packaging	–	–	–	–
Storage temperature at time of selling, n (%)				
Cold	–	–	30 (81.1)	20 (58.8)
Warm	31 (73.8)	–	–	2 (5.9)
Room temperature	11 (26.2)	40 (100.0)	7 (18.9)	12 (35.3)

^a Specific types of savoury pie: meat (n = 42); cheese (n = 42); potato (n = 41); spinach (n = 23); mushroom (n = 21); pumpkin (n = 20); *gourmet* (n = 10); *kljukuša* (n = 2); plain (n = 1); vegetarian (n = 1); and *imperial* (n = 1).

^b Specific types of bread: *kifla* (n = 37); white bread (n = 34); dark bread (n = 31); corn bread (n = 28); integral bread (n = 27); rye bread (n = 25); bread with seeds (n = 24); and *perec* (n = 22).

^c Specific types of sandwich: sausage (n = 34); ham (n = 36); chicken (n = 18); tuna (n = 12); smoked beef (n = 8); mortadella (n = 8); turkey (n = 3); prosciutto (n = 3); egg and sausage (n = 2); smoked pork (n = 2); tortilla (n = 2); and vegetarian (n = 1).

^d Specific types of sweet pie: apple (n = 28); cherry (n = 27); other fruits (n = 2); poppy seeds (n = 1); chocolate (n = 1); and walnut (n = 1).

Beverages

A wide range of beverages was available in both street food and takeaway food vending sites in Banja Luka (Table 8). The most commonly available beverages were soft drinks (94.9%), water (92.4%) and fruit juice-based drinks (83.9%); these were fairly evenly distributed across street food and takeaway food vending sites. A high proportion of alcoholic (50.9%), traditional (50.0%) and energy (49.2%) drinks was also found in Banja Luka. Alcoholic and energy drinks were more common in street food vending sites (63.5% and 82.5, respectively), traditional beverages in takeaway food vending sites (90.9%). Of the latter, yoghurt (50.0%) and *kefir* (5.9%) were the most commonly available.

The availability of beverages was similar in street food and takeaway food vending sites. Of the most commonly available beverages, the traditional varieties were less common in street food vending sites (street food: 14.3%; takeaway food: 90.9%), while at street food vending sites it was more common to find alcoholic drinks (street food: 63.5%; takeaway food: 36.4%) and energy drinks (street food: 82.5%; takeaway food: 10.9%).

Table 8. Types of beverage offered at street food and takeaway food vending sites in Banja Luka, overall, by setting and by type of establishment

	Total (n=118)	Type of establishment		Setting	
		Street food (n=63)	Takeaway food (n=55)	Centar 1 (City Market) (n=106)	Other areas (bus stops) (n=12)
Type of beverage (%)					
Soft drinks	94.9	96.8	92.7	97.2	75.0
Water	92.4	97.3	90.9	94.3	75.0
Fruit juice-based drink	83.9	93.7	90.9	84.9	75.0
Alcoholic beverages ^a	50.9	63.5	36.4	52.8	33.3
Traditional beverages ^b	50.0	14.3	90.9	48.1	66.7
Yoghurt	50.0	14.3	90.9	48.1	66.7
<i>Kefir</i>	5.9	1.6	10.9	1.6	10.9
<i>Boza</i>	1.7	0.0	3.6	1.9	0.0
<i>Ayran</i>	0.9	0.0	1.8	0.0	1.8
Energy drinks	49.2	82.5	10.9	49.1	50.0
Coffee	16.1	3.2	30.9	17.0	8.3
Tea	15.3	3.2	29.1	16.0	8.3
Milk	15.3	3.2	29.1	12.3	41.7
Fresh fruit-based drinks ^c	2.5	0.0	5.5	2.8	0.0

^a Alcoholic beverages: beer (n=59); wine (n=22); beer with juice or lime (n=20); spirits (n=15).

^b Traditional beverages: *kefir* is a fermented milk drink prepared by inoculating cow, goat or sheep milk with *kefir* grains; *boza* is a fermented malt beverage made from wheat and/or corn or millet, or barley, of thick consistency, low alcohol content (around 1%), and a slightly acidic sweet flavour; *ayran* is a dairy-based fermented beverage made from sheep's milk.

^c Includes fresh fruit juice (n=2) and lemonade (n=2).

Nutritional composition of foods collected

The nutritional composition of the 30 most commonly available foods other than fruit that were collected in the streets of Banja Luka is shown in Table 9. A wide range of food products was analysed, including (for example) sweet and savoury snacks and pastries, fast food and traditional main dishes. The TFA, sodium and potassium content varied substantially across the products analysed, with high values of these nutrients (relative to serving size) found mainly in homemade foods.

The mean TFA content per serving was highest for the following homemade foods: cake (2.32 g), *ćevapi* (1.71 g), cheese puff pastry (1.50 g) and croissant (1.30 g), corresponding to 104.8%, 76.9%, 67.7% and 58.9%, respectively, of the recommended maximum daily intake of TFA (based on a reference daily intake of 2000 kcal for an average adult). The mean TFA content per serving was lowest for homemade *perec* bread (0.01 g), industrial salted peanuts (0.01 g), homemade sweet pie (0.01 g) and homemade dark and white bread (0.00 g), corresponding to 0.8%, 0.5%, 0.4% and 0.1%, respectively, of the recommended maximum daily intake of TFA.

The highest mean sodium content per serving was observed in the following homemade foods: sausage barbecue (2232 mg), *ćevapi* (2140 mg), meat savoury pie (2079 mg) and pizza (1241 mg), corresponding to 111.6%, 107.0%, 103.9% and 62.1%, respectively, of the recommended maximum daily intake. The lowest mean sodium content per serving was observed in the following industrial foods: chocolate (85 mg), biscuits/cookies (80 mg), cereal bars (53 mg) and ice-cream (38 mg), corresponding to 4.2%, 4.0%, 2.6% and 1.9%, respectively, of the recommended maximum daily intake.

The mean potassium content per serving was highest for the following homemade foods: sausage barbecue (782 mg), *ćevapi* (536 mg), meat savoury pie (390 mg) and pizza (292 mg), corresponding to 22.3%, 15.3%, 11.1% and 8.3%, respectively, of the recommended minimum daily intake for potassium. The mean potassium content per serving was lowest for the following foods: homemade cream pie (85 mg), industrial salted sticks (70 mg), industrial salty crackers (64 mg) and industrial cereal bars (52 mg), corresponding to 2.4%, 2.0%, 1.8% and 1.5%, respectively, of the recommended minimum daily intake for potassium.

These results show that a number of street and takeaway foods available in Banja Luka are nutritionally inadequate with respect to their TFA, sodium and potassium content. For example, a single portion of some traditional homemade dishes, such as meat savoury pie, sausage barbecue and *ćevapi*, exceeds the recommended maximum daily sodium intake. Furthermore, most of these foods have a high TFA content. Conversely, the ready-to-eat foods analysed generally presented low potassium content. The highest potassium content was found in the same traditional dishes that had the highest sodium content, which may be due to the fact that the most commonly available garnish for these dishes is fried potatoes, which provide potassium but are often high in sodium.

Some homemade cakes, and sweet and savoury pastries, presented a high TFA content; this raises particular concerns as these types of food may be eaten regularly throughout the day.



Table 9. Nutritional composition of food samples evaluated by bromatological analysis in Banja Luka (n=120)

		TFA			Sodium			Potassium		
	N	Mean serving size (g)	Mean (min–max) g/serving	% Recom.*	Mean (min–max) mg/serving	% Recom.*	Mean (min–max) mg/serving	% Recom.*	Mean (min–max) mg/serving	% Recom.*
<i>Industrial foods</i>										
Biscuits (cookies) ^a	4	40	0.37 (0.03 –1.31)	16.7	80 (33 –122)	4.0	103 (61 –129)			2.9
Cereal bars ^a	4	26	0.02 (0.00 –0.04)	0.8	53 (6 –84)	2.6	52 (32 –63)			1.5
Chocolate ^a	4	67	0.09 (0.01 –0.18)	4.5	85 (24 –140)	4.2	275 (106 –435)			7.8
Corn snacks ^a	4	38	0.04 (0.01 –0.06)	1.9	264 (237 –298)	13.2	112 (96 –143)			3.2
Crisps (chips) ^a	4	34	0.04 (0.02 –0.05)	1.9	239 (139 –322)	11.9	256 (116 –532)			7.3
Croissant ^a	4	63	0.07 (0.06 –0.08)	3.3	116 (105 –136)	5.8	69 (51 –86)			4.1
Ice-cream ^a	4	65	0.03 (0.01 –0.09)	1.6	38 (33 –43)	1.9	158 (82 –258)			4.5
Salted peanuts ^a	4	40	0.01 (0.00 –0.02)	0.5	301 (264 –329)	15.0	241 (213 –278)			6.9
Salted sticks ^a	4	39	0.28 (0.01 –0.84)	12.5	416 (332 –492)	20.8	70 (44 –113)			2.0
Salty crackers ^a	4	40	0.03 (0.01 –0.05)	1.5	376 (293 –462)	18.8	64 (40 –110)			1.8
<i>Homemade foods</i>										
Bread (dark and white) ^c	4	89	0.00 (0.00 –0.01)	0.1	459 (403 –533)	22.9	162 (109 –210)			4.6
Bread (<i>kifla</i>) ^c	4	82	0.04 (0.01 –0.12)	2.2	365 (329 –443)	18.2	102 (69 –140)			2.9
Bread (<i>perec</i>) ^c	4	79	0.01 (0.01 –0.02)	0.8	606 (377 –868)	30.3	101 (79 –128)			2.9
Cake ^c	4	116	2.32 (0.15 –6.92)	104.8	126 (85 –172)	6.3	146 (81 –256)			4.2
Ćevapi ^b	4	318	1.71 (0.79 –2.37)	76.9	2140 (1529 –2527)	107.0	536 (346 –700)			15.3
Cream pie ^c	4	141	0.22 (0.04 –0.28)	10.1	129 (73 –170)	6.5	85 (59 –109)			2.4
Croissant ^c	4	109	1.30 (0.75 –1.97)	58.9	441 (260 –518)	22.0	116 (93 –137)			3.3
Doughnut ^c	4	100	0.12 (0.07 –0.20)	5.5	322 (212 –402)	16.1	157 (93 –260)			4.5
Muffin ^c	4	79	0.19 (0.04 –0.39)	8.5	129 (18 –291)	6.5	152 (91 –257)			4.3
Pizza ^c	4	203	0.46 (0.37 –0.60)	21.0	1241 (1018 –1647)	62.1	292 (202 –403)			8.3
Puff pastry (cheese) ^c	4	114	1.50 (1.22 –1.68)	67.7	499 (211 –798)	25.0	105 (56 –170)			3.0

		TFA			Sodium			Potassium		
		Mean serving size (g)	Mean (min–max) g/serving	% Recom.*	Mean (min–max) mg/serving	% Recom.*	Mean (min–max) mg/serving	% Recom.*	Mean (min–max) mg/serving	% Recom.*
Puff pastry (sausage) ^c	4	192	1.24 (0.05 –1.66)	56.2	783 (751 –852)	39.1	155 (136 –174)	4.4		
Sandwich (ham) ^c	4	192	0.26 (0.09 –0.45)	12.0	1113 (841 –1460)	55.6	286 (213 –375)	8.1		
Sandwich (sausage) ^c	4	123	0.43 (0.35 –0.52)	19.7	1207 (845 –1448)	60.4	334 (210 –424)	9.5		
Sausage barbecue ^b	4	387	0.65 (0.36 –1.01)	29.4	2232 (1761 –3105)	111.6	782 (565 –938)	22.3		
Savoury pie (cheese) ^d	4	345	0.88 (0.18 –1.24)	39.6	1868 (1548 –2308)	93.4	325 (302 –336)	9.3		
Savoury pie (meat) ^d	4	325	0.78 (0.45 –0.96)	35.0	2079 (1271 –2623)	103.9	390 (333 –473)	11.1		
Stuffed roll (cheese) ^c	4	110	0.45 (0.05 –1.06)	20.4	535 (328 –371)	26.7	139 (115 –159)	4.0		
Sweet pastries ^c	4	104	0.84 (0.03 –2.08)	38.0	384 (147 –910)	19.2	184 (46 –438)	5.2		
Sweet pie ^c	4	126	0.01 (0.00 –0.01)	0.4	221 (120 –381)	11.0	160 (61 –245)	4.6		

* % recom. = % of WHO-recommended daily intake (based on a reference intake of 2000 kcal for an average adult):

- **TFA:** <1% Total Energy Value/day;
 - **sodium:** < 2000 mg/day;
 - **potassium:** ≥ 3510 mg/day.
- ^a Foods collected at street food vending sites.
^b Foods collected at takeaway food vending sites (čevabdžinica, “barbecue place”).
^c Foods collected at takeaway food vending sites (bakery).
^d Foods collected at takeaway food vending sites (*buregdžinica*, “pie place”, and bakery).

5. Conclusions and policy implications

This report gives an overview of the food context in Banja Luka, the Republika Srpska, Bosnia and Herzegovina, using a standardized methodology. The urban food environment is mixed, characterized by the coexistence of street food vending sites and more formal establishments selling takeaway food – namely, bakeries, *ćevabdžinica* (“barbecue places”) and *buregdžinica* (“pie places”). Ready-to-eat food is available throughout the city, with a concentration in the city centre. Among the 125 eligible vendors interviewed for this report, most were women, employees of the business, and working on street food vending sites. The majority of street food and takeaway food vendors had access to basic sanitary facilities.

Foods other than fruit were sold at every vending site and beverages at 94.4% of such sites. Fruit was not available in the eligible food vending sites identified for the study. Vending sites exclusively selling unprepared fresh fruit were not included in the study sample, so it may be that the availability of fruit is not fully captured by the report. Nevertheless, there is a need to increase the availability of nutritionally dense foods, such as fruit and vegetables, that are rich in fibre and sources of potassium and other micronutrients to the urban population of Banja Luka through markets and other forms of street food supply.

A range of beverages was sold in the streets of Banja Luka. Soft drinks were the most frequent, followed by water and, to a lesser extent, fruit juice-based drinks. This suggests the rising influence of a western-style diet; this is especially concerning given the high sugar content of these drinks, which are known (from observations in other countries) to be the main source of added sugar in the diet (24). This is likely to contribute to excess energy intake and weight gain, running counter to WHO’s recommendation that the intake of free sugars should be reduced throughout the life-course (24). On the other hand, traditional beverages were also widely available, which suggests the continued existence of traditional food habits. The availability of alcoholic beverages was relatively high – they were found in half the eligible vending sites selling beverages. As stated in the Policy for Improvement of Health of the Population in the Republic of Srpska (16), one means to achieve the global strategy for reducing the burden of NCDs in the region is to reduce harmful alcohol consumption (25), and this requires limiting the availability of alcoholic beverages within the urban context.

Concerning foods other than fruit sold within the urban food environment, industrial foods were more often available than homemade foods. The 30 foods most commonly observed in the streets of Banja Luka included various sweet and savoury snacks, as well as traditional main dishes and different types of sweet and savoury pastries. With respect to their nutritional composition, the highest values for sodium were found in homemade foods, some of which exceeded 50% (and, in a few cases, 100%) of the recommended daily sodium intake; these foods included traditional main dishes (e.g. barbecue and savoury pies) and snacks (e.g. savoury pastries and sandwiches). This finding underlines the importance of increasing awareness among food vendors (in both street food and takeaway food vending sites) of the need to avoid adding excess salt during cooking and food preparation and to choose healthier ingredients instead. Among industrial foods, savoury snacks presented the highest sodium content. In view of this, efforts towards reformulation of industrially processed foods to decrease their sodium content may benefit from regulatory measures. Regarding the TFA content, high values per serving were found in homemade foods – in particular, main dishes and sweet and savoury pastries. This is especially concerning as most of these foods are regularly eaten during the day, possibly leading to excessive intake of a nutrient that is clearly harmful to health. These results back up the findings of a previous multicentre study conducted in several European countries, in which the highest levels of artificial TFA were found in industrial foods sold in supermarkets in Bosnia and Herzegovina (26).

From these results, it is clear that promotion of healthy diets needs to be prioritized and foregrounded within wider work on food security/nutrition in the Republika Srpska; a focus on salt and TFA would provide an effective strategic starting point. There are various practical policy options available to encourage a move towards a healthier street food environment; such initiatives should be incorporated into existing policy processes (16). Doing so would help to strengthen action in the Republika Srpska aimed at promoting healthy diets and preventing diet-related NCDs.

Reducing the salt and TFA content of ready-to-eat foods sold in street and takeaway food vending sites is likely to require a multipronged approach. One aspect will involve health promotion activities to educate street and takeaway food vendors to

use less salt and healthier fats; at the same time, measures are needed to raise public awareness that these foods can be harmful to health if consumed in excess. A second component will involve government showing leadership and taking on a regulatory role.

Taking its lead from initiatives successfully implemented in other countries (27), the government might consider measures aimed at encouraging manufacturers and vendors to shift to healthier ingredients. The slender margins made by street food vendors and small-scale manufacturers mean that they are extremely price-conscious, so in regard to TFA, for example, their choice of cooking fat is likely to be strongly influenced by price (28). Efforts by governments to increase the availability and affordability of healthier oils for use by food vendors and manufacturers (for example, in frying and in pastry preparation) could lead to significant changes in dietary intake, as has been successfully accomplished in other contexts (29). For example, the Healthier Hawker Programme (Singapore) improved availability of and access to healthier oils, reduced-sodium salt and other ingredients, by bulk purchasing and improving the logistics and supply to street vendors. This, in turn, reduced prices and encouraged vendors to swap to healthier ingredients and thus to offer healthier food options (27, 29).

The government could also play a leading role in introducing legislation on TFA and adopting salt-reduction targets for industrially produced foods (e.g. savoury snacks, bread). For TFA, such regulation is likely to follow the model successfully introduced in seven countries of the WHO European Region, where a maximum limit of 2 g TFA per 100 g total fat has been established. For salt, regulation could take the form of setting maximum limits, as has already been done in many countries, such as Turkey, Greece and Finland, and – perhaps most comprehensively – in South Africa and Argentina (30). Such rules would then apply to all foods available on the market, including supermarkets and takeaway and street food vending sites, to ensure a level playing field. One final measure could be to improve the nutritional information provided on food packaging in the Republika Srpska, to ensure that all products provide a nutrient declaration (which would include sodium and TFA) in addition to an ingredients list.

Such policies require, additionally, regular monitoring. For both salt reduction and TFA elimination, an important starting point will be to map local food suppliers (e.g. manufacturers of oils and fats used in freshly prepared products, wholesale producers, manufacturers of breads, pastries and confectionary, savoury snacks, drinks, and processed meats), in order to engage them and monitor their compliance with regulations and guidance. Such a mapping was previously conducted in India, for example, where the barriers to reducing the use of TFA, as well as the opportunities to do so, were explored in order to improve compliance with the government's adopted policy (31). Taking international food suppliers into consideration will also be important.

A particularly good example of a monitoring process to ensure compliance with legislation comes from Denmark, which introduced a ban on TFA in food in 2003 (32). In line with this initiative, WHO recently developed a guide to elimination of industrially produced TFA from the global food supply at the national level: the "REPLACE Trans Fat" action package (33). This guide outlines six strategic action areas:

- to review dietary sources of industrially produced TFA;
- to promote replacement of industrially produced TFA with healthier fats and oils;
- to legislate or enact regulatory actions to eliminate industrially produced *trans* fats;
- to assess and monitor TFA content in the food supply and changes in TFA consumption in the population;
- to create awareness of the negative health impact of TFA among policy-makers, producers, suppliers and the public; and
- to enforce compliance with existing policies and regulations.

Together, such activities would contribute significantly to promotion of healthy diets and prevention of obesity in the Republika Srpska, complying with the objectives defined by the Policy for Improvement of Health of the Population in the Republic of Srpska by the Year 2020 (16).

This study shows that there is considerable scope for improving the nutritional adequacy of street and takeaway foods sold in Banja Luka. It also underlines the need for health policies targeted at enhancing the nutritional quality of such foods – while protecting their cultural and community role – in order to prevent the occurrence of diet-related NCDs in the country. Regulating the production of safe, affordable and nutritious street and takeaway foods, while also promoting the population's access to vendors selling/promoting healthy foods, is imperative if we are to tackle NCDs and associated health disparities in the urban context.



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Annex 1

Examples of industrial foods collected in food vending sites in Banja Luka

Fig. 1.1
Biscuits
(cookies)



Fig. 1.2
Cereal bar

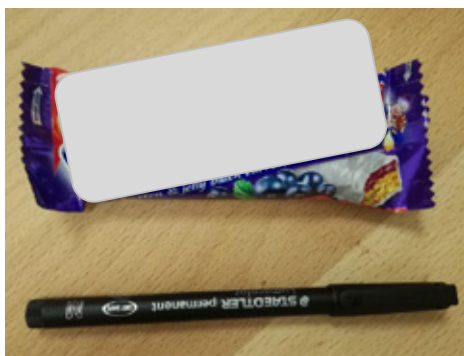


Fig. 1.3
Chocolate



Fig. 1.4
Corn snacks
(with fresh
peanuts)



Fig. 1.5
Crisps (chips)



Fig. 1.6
Croissant



Fig. 1.7
Ice-cream



Fig. 1.8
Salted
peanuts



Fig. 1.9
Salted sticks



Fig. 1.10
Salty
crackers



Annex 2

Examples of homemade foods collected in food vending sites in Banja Luka

Fig. 2.1
Bread (dark)



Fig. 2.2
Bread (kifla)



Fig. 2.3
Bread (perec)



Fig. 2.4
Cake



Fig. 2.5
Ćevapi

Beef or lamb minced meat rolled into small sausages, seasoned with spices; served with onions and a traditional bread, lepinja.



Fig. 2.6
Cream pie



Fig. 2.7
Croissant



Fig. 2.8
Doughnut



Fig. 2.9
Muffin



Fig. 2.10
Pizza



Fig. 2.11
Puff pastry
(cheese)



Fig. 2.12
Puff pastry
(sausage)



Fig. 2.13
Sandwich
(ham)



Fig. 2.14
Sandwich
(sausage)



Fig. 2.15
Sausage
barbecue



Fig. 2.16
Savoury pie
(cheese)



Fig. 2.17
Savoury pie
(meat)

Known as *burek*, this is a type of baked pie, filled with meat, usually beef.

There are other versions of this traditional dish with fillings of (e.g.) spinach, potato or chicken meat.



Fig. 2.18
Stuffed roll
(cheese)



Fig. 2.19
Sweet pastry

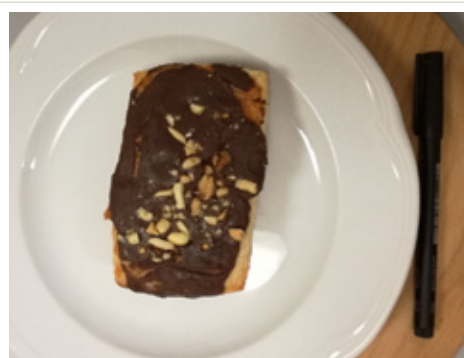


Fig. 2.20
Sweet pie



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