



FEEDcities project

The food environment description in cities in Eastern Europe and Central Asia - Kyrgyzstan



Technical report
August 2017



ISPUP

INSTITUTO DE SAÚDE PÚBLICA
DA UNIVERSIDADE DO PORTO

FEEDcities project

The food environment description in cities in
Eastern Europe and Central Asia - Kyrgyzstan

Technical report
August 2017

Abstract

This technical report presents the results of a cross-sectional survey conducted in Bishkek, Kyrgyzstan, between June and July 2016, as part of the FEEDcities Project – Eastern Europe and Central Asia. The aim was to describe the local street food environment: the characteristics of the vending sites, the food offered and the nutritional composition of the industrial and homemade foods often available in these settings. The report also provides guidance for policies to translate the findings into action.

The study was conducted within a bilateral partnership between WHO and the Institute of Public Health of the University of Porto, Portugal, 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 numbers 2015/591370 and 2017/698514). This study was made possible by funding from the Government of the Russian Federation within the context of the WHO European Office for the Prevention and Control of Noncommunicable Diseases (NCD Office).

Keywords

trans-Fatty acids
Food analysis
Nutritional composition
Potassium
Ready-to-eat food
Sodium
Street food
Kyrgyzstan

Address requests for publications of the WHO Regional Office for Europe to:

Publications
WHO Regional Office for Europe
UN City, Marmorvej 51
DK-2100 Copenhagen Ø, Denmark

Alternatively, complete an online request form for documentation, health information or permission to quote or translate on the Regional Office web site (<http://www.euro.who.int/pubrequest>).

© World Health Organization 2017

All rights reserved. The Regional Office for Europe of the World Health Organization welcomes requests for permission to reproduce or translate its publications, in part or in full.

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted lines on maps represent approximate border lines for which there may not yet be full agreement.

The mention of specific companies or of certain manufacturers' products does not imply that they are endorsed or recommended by the World Health Organization in preference to others of a similar nature that are not mentioned. Errors and omissions excepted, the names of proprietary products are distinguished by initial capital letters.

All reasonable precautions have been taken by the World Health Organization to verify the information contained in this publication. However, the published material is being distributed without warranty of any kind, either express or implied.

The responsibility for the interpretation and use of the material lies with the reader. In no event shall the World Health organization be liable for damages arising from its use. The views expressed by authors, editors, or expert groups do not necessarily represent the decisions or the stated policy of the World Health Organization.

Contents

Contributors.....	iv
Acknowledgements	iv
Abbreviations and acronyms	v
Executive summary.....	v
Introduction	1
Street food in Bishkek	1
Objectives	2
Methods.....	2
Street food vending sites and food offered.....	3
Analysis of street foods.....	4
Statistical analysis.....	6
Results.....	6
Distribution of selected markets and vending sites	6
Characteristics of vendors and vending sites	8
Characteristics of street food offered.....	9
Nutritional composition of street foods	11
Conclusions and policy implications.....	12
References.....	16
Annex 1.	18
Annex 2.	20

Tables

Table 1. Markets selling ready-to-eat food in Bishkek.....	3
Table 2. Definition of food sample sets	5
Table 3. Framework for random sampling of food products	5
Table 4. Characteristics of street food vendors, overall and by district.....	8
Table 5. Physical characteristics of stationary vending sites, overall and by district.....	9
Table 6. Food offered at street food vending sites, by type of vendor and district.....	9
Table 7. Characteristics of a sub-sample of the most common homemade foods offered at stationary vending sites	10
Table 8. Types of beverages offered at stationary vending sites, overall and by district	11
Table 9. Nutritional composition of the street food samples from markets in Bishkek	13

Figures

Fig. 1. Selected markets and street food vending sites in Bishkek	6
Fig. 2. Alamedin market zone and street food vending sites evaluated	7
Fig. 3. Chinaar market zone and street food vending sites evaluated	7
Fig. 4. Dordoi market zone and street food vending sites evaluated	7
Fig. 5. Aziz–Bayat market zone and street food vending sites evaluated	7
Fig. 6. Zhumushchu market zone and street food vending sites evaluated	7
Fig. 7. Bereket–Universal market zone and street food vending sites evaluated.....	7
Fig. 8. Cholpon market zone and street food vending sites evaluated.....	8
Fig. 9. Ak-Emir market zone and street food vending sites evaluated.....	8
Fig. 10. Kok-Sai market zone and street food vending sites evaluated.....	8
Fig. 11. Almaluu market zone and street food vending sites evaluated	8

Contributors

This report was written by Patricia Padrão, Gabriela Albuquerque and Nuno Lunet (University of Porto, Portugal), Marcello Gelormini (WHO consultant) and Jo Jewell (WHO Regional Office for Europe).

Further contributions were made by João Breda (WHO Regional Office for Europe); Susana Casal, Andreia Lemos, Eulália Mendes, Pedro Moreira, Olívia Pinho, Daniela Rodrigues and Raquel Teixeira (University of Porto, Portugal); Albertino Damasceno (Eduardo Mondlane University, Mozambique) and Inês Morais (WHO consultant).

Acknowledgements

Preparation of this report was coordinated by the University of Porto in collaboration with the WHO Regional Office for Europe and the WHO Country Office in Kyrgyzstan through a biennial collaborative agreement covering 2016–2017 between the Ministry of Health of Kyrgyzstan and WHO. Funding was also made available from the Government of the Russian Federation within the context of the WHO European Office for the Prevention and Control of Noncommunicable Diseases (NCD Office).

The FEEDCities Project in Kyrgyzstan was implemented under the overall guidance of Jarno Habicht, WHO Representative at the Country Office in Kyrgyzstan, Gauden Galea, Director of the Division of Noncommunicable Diseases and Promoting Health through the Life-course, WHO Regional Office for Europe and João Breda, Head WHO European Office for Prevention and Control of Noncommunicable Diseases & a.i. Programme Manager on Nutrition, Physical Activity and Obesity, Division of Noncommunicable Diseases and Promoting Health through the Life-course, WHO Regional Office for Europe. Technical and logistical support was provided by Oskonbek Moldokulov, National Professional Officer, and Begaiym Kalysbekova, WHO Country Office in Kyrgyzstan. Support for the study and the methods used in the field in Kyrgyzstan were provided by Inês Morais, Jo Jewell and Marcello Gelormini.

The authors express their sincere gratitude to the Government officials of Kyrgyzstan who provided strong support for the FEEDCities project, notably: Dr Oleg Gorin, Deputy Minister of Health; Dr Baktygul Ismailova, Head of the Public Health Department, Ministry of Health; Mr Albek Ibraimov, Mayor of Bishkek; Dr Artur Buiuklianov, Head of Bishkek Centre, State Sanitary and Epidemiological Control, Ministry of Health; Dr Mukhamadhalil Murzashev, Head of the Food Hygiene Department, Bishkek Centre of State Sanitary and Epidemiological Control, Ministry of Health; and Dr Roza Dzhakypova, Coordinator for Noncommunicable Diseases, Ministry of Health.

Special thanks also go to the team of field researchers from the Kyrgyz Medical Academy, the Centre for Therapy and Cardiology and the Bishkek Centre of State Sanitary and Epidemiological Control, who were involved in collecting and preparing the food samples and interviewing vendors.

The work of Gabriela Albuquerque was funded by FEDER through the Operational Programme Competitiveness and Internationalization and national funding from the Foundation for Science and Technology (Portuguese Ministry of Science, Technology and Higher Education; POCI-01-0145-FEDER-006862; UID/DTP/04750/2013), within the project for food environment description in five cities in Central Asia and countries in the Caucasus (SFRH/BD/118630/2016) and the Unidade de Investigação em Epidemiologia, Instituto de Saúde Pública da Universidade do Porto (POCI-01-0145-FEDER-006862; UID/DTP/04750/2013).

Patrícia Padrão, Susana Casal, Pedro Moreira and Nuno Lunet are members of Epidemiology Research Unit, Institute of Public Health, University of Porto, Porto, Portugal.

The bromatological analyses were performed at the Rede de Química e Tecnologia (“Requimte”), University of Porto, Porto, Portugal (POCI/01/0145/FEDER/007265; UID/QUI/50006/2013), under the coordination of Susana Casal. Sodium and potassium analyses were conducted at the Faculty of Nutrition and Food Sciences, University of Porto, Portugal, under the coordination of Olívia Pinho.

This report is a deliverable of the biennial collaborative agreement for 2016–2017 between Kyrgyzstan’s Ministry of Health and the WHO Regional Office for Europe.

Abbreviations and acronyms

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

Executive summary

This report presents the results of an analysis of the street food context in Bishkek, Kyrgyzstan, conducted with a standardized method. The study revealed both positive and troubling results, highlighting areas in which policy action might be required.

The Food and Agriculture Organization of the United Nations (FAO) and WHO have defined “street food” as “ready-to-eat foods and beverages prepared and/or sold by vendors and hawkers especially in streets and other similar places”. Especially in urban areas of low- and middle-income countries, street food is diverse and constitutes a widely accessible, inexpensive source of food, although they are often highly energy-dense foods, rich in fat, sugar and sodium. Previous research on street food mainly addressed food safety (hygiene and toxicity) and not their nutritional contribution to the diet of the population. Little or no research has been conducted in the WHO European Region.

The main objective of the “FEEDcities Project – Eastern Europe and Central Asia” is to characterize the street food environment in cities in eastern Europe and Central Asia. The study supports implementation of the WHO European Food and Nutrition Action Plan 2015–2020, providing information for achieving certain of the objectives, such as creating healthy food and drink environments and extending surveillance, monitoring, evaluation and research. The report describes characterization of the vending sites and their food offers as well as the nutritional composition (*trans*-fatty acids [TFA], sodium and potassium contents) of the street foods most commonly available in Bishkek, the capital city of Kyrgyzstan.

Between June and July 2016, street food vending sites in the public markets of Bishkek were identified by random and systematic sampling. Vending sites that sold only unprepared fresh fruit were not eligible. Ten public markets were selected, and 600 eligible vendors were interviewed; 120 food samples comprising four samples of each of the 30 most commonly available foods (20 homemade and 10 industrial) were collected and analysed.

Street food products were grouped as fruit (fresh and dried), beverages (alcoholic and non-alcoholic) and foods other than fruit and beverages, which were classified as homemade (cooked and/or prepared at home or at the street) or industrial (produced by the food industry).

Both stationary (72.7%) and mobile (27.3%) street food vending sites were identified. The vendors were mainly women (77.8%) and owned their business (54.5%). Generally, food was sold 7 days a week (82.8% of vending sites) and in all four seasons (71.6% of the vending sites), regardless of the weather (74.5% of the vending sites).

A wide variety of both homemade and industrial foods were found, representing a rich street food culture. Fruit was sold at only 4.4% of the vending sites (mobile: 2.4%; stationary: 5.1%), while foods other than fruit were available at 85.5% of the sites (mobile: 90.2%; stationary: 83.7%). Beverages were sold at 61.6% of the vending sites (mobile: 59.8%; stationary: 62.3%).

Sites selling foods other than fruit sold only homemade (overall: 56.9 %; mobile: 64.1%; stationary: 53.8%), only industrial products (overall: 21.1%; mobile: 13.1%; stationary: 23.1%) or both homemade and industrial foods (overall: 23.0%; mobile: 22.8%; stationary: 23.1%). Tea and soft drinks were the most commonly sold beverages, in 57.5% and 56.2% of the sites selling beverages, respectively.

High TFA and sodium levels were frequent in the most commonly available foods analysed. The mean TFA content per average serving was 3.78 g in industrial wafers, 2.86 g in homemade *manty* (a boiled or steamed pasta-wrapped snack usually filled with a spicy meat mixture) and 1.57 g in homemade *samsa* (also known as *sambusa* or *samosa*; ground lamb, beef or chicken and vegetables wrapped in flaky pastry or bread), corresponding to 170.4%, 128.9% and 70.8% of the recommended maximum daily intake of TFA (on the basis of a reference daily intake of 2000 kcal for an average adult), respectively. These levels indicate that cooking fats and shortening containing TFA are widely used in preparing foods. The highest mean sodium contents per serving were in homemade *lagman* (a traditional noodle dish made of chopped peppers and other vegetables served in a spicy, vinegary sauce) (1980 mg), homemade *ashlyamfu* (a traditional noodle dish with chopped vegetables and/or meat, served cold or warm) (1687 mg) and homemade *manty* (1658 mg), corresponding to 99.0%, 84.4% and 82.9% of the recommended maximum daily intake, respectively. The industrial foods with a high sodium content were commercial versions of traditional drinks (*chalap*, made from fermented milk, salt and carbonated water, and *maksym*, a fermented beverage made from grain, usually malt) and some savoury snacks. Thus, excess salt is used by street vendors preparing homemade foods and is also present in excess in some industrial products. The mean potassium content per serving was highest in homemade *lagman* (645 mg), homemade hamburger (634 mg) and home-cooked corn (571 mg), corresponding to 18.4%, 18.0% and 16.2% of the recommended minimum daily intake of potassium.

Fresh fruit was less widely available than other foods or drinks. Increasing the availability of this type of food could help to ensure that urban residents have ready, convenient access to this essential part of a healthy diet. The types of drinks and food other than fruit on offer in Bishkek could also be improved, as could the nutritional composition of the street food sold. The wide availability of sugary soft drinks is a concern in light of the increasing rates of overweight and obesity.

Strategic thinking is required to improve the nutritional quality of street foods available in Bishkek while at the same time protecting the important cultural and community role that market vendors play in sustaining traditional diets and providing access to food such as fruit and vegetables. The practical policy options for moving towards a healthier street food environment should be integrated into existing national policy processes, such as the noncommunicable diseases (NCDs) programme and the food security and nutrition programme. This would help to strengthen the promotion of healthy diets and prevention of obesity.

Reducing the salt content of ready-to-eat foods sold at street vending sites would require a multi-pronged approach. One aspect would be activities to educate street food vendors to use less salt and to raise awareness in the public about foods that may have a high salt content and are harmful to health when consumed in excess. A second, increasingly important means for changing nutritional quality in Kyrgyzstan would be to consider adopting salt reduction targets for industrially produced food (e.g. savoury snacks, bread and drinks), perhaps by setting maximum limits by regulation. As the regulation would apply to all foods available on the market, including in supermarkets, all food sellers would be affected equally. Another aspect would be to improve the nutritional information on packaged foods to ensure that all products bear a declaration of nutrients (including sodium), in addition to a list of ingredients.

With regard to TFA in food, Kyrgyzstan has already adopted a technical regulation on fats and oils in food products through its membership in the Eurasian Economic Union, which commits the country to limit the availability and use of TFA in food products by 2018. This study indicates that progress must be made to achieve compliance by 2018, and continuous monitoring will be necessary after that deadline.

The study also revealed the widespread availability of sugary drinks in the city. Given their potential to provide excess caloric intake, particularly by children, consideration should also be given to enacting policies to reduce their availability, notably in the vicinity of schools.

Kyrgyzstan might therefore consider the following:

- giving greater priority to promoting healthy diets and preventing obesity in existing programmes on NCDs, food security and nutrition;
- finding means for work among sectors such as health and agriculture to make the changes recommended in the national food security and nutrition programme;
- defining priorities to respond to the problem of excess salt and TFAs in foods and reduce the widespread availability of sugary drinks, including setting targets and/or maximum limits on the salt content of some products, enforcing TFA legislation and monitoring compliance, improving nutrition labelling and restricting the availability of sugary drinks in the vicinity of schools and other educational establishments; and
- strengthening national capacity to monitor the composition of foods and compliance with regulations, including routine sampling and analysis of local and imported foods in order to monitor policies and define the next steps.

The initial findings of this study were discussed at a jointly convened meeting between the Ministry of Health and representatives of the WHO Regional Office for Europe in Bishkek in late 2016. This report should serve as the basis for further discussion, capacity-building and policy development.



МАЙ НАН
20с.



МАЙ НАН
25с.

Май нан
20

Introduction

The Kyrgyz Republic is a landlocked country located in the southeastern region of Central Asia, with a population of about six million people (1). It is a low- to middle-income country with an annual gross domestic product of US\$ 6.57 billion (2). The capital, Bishkek, concentrates over 900 000 people and is the largest city in the country (3). The poverty rate (the threshold for a person's minimum nutritional, clothing and shelter needs to be met (2)) decreased from 40% in 2006 to 32% in 2015. The population is widely dispersed, with approximately 66% of the inhabitants in rural areas (1). The country has a high rate of population growth, with 32% of the population aged under 15 years and 4% aged over 65 years. Life expectancy at birth is estimated to be 73.7 years for women and 65.7 years for men (1).

Cardiovascular disease is the leading cause of death, accounting for 49% of all deaths (ischaemic heart disease: 32%; stroke: 14%). About 15% of the deaths are attributable to other noncommunicable diseases (NCDs), with 10% to cancer, 4% to chronic respiratory diseases and 1% to diabetes (4). Overweight and obesity affect 56% and 23% of the population aged over 20 years, respectively (5). Among children, the estimated prevalence of overweight is 9% (1), although nutritional deficiencies are still found in this age group, with 18% of children under 5 years being stunted, 3% wasted and 3% underweight (1). Overall, Kyrgyzstan is facing a growing burden of NCDs, despite efforts by the Government since 2006 (6). Since 2000, there has been a substantial decrease in mortality due to infectious diseases and moderate decreases in mortality due to diabetes and respiratory diseases (7).

Central Asian countries in the WHO European Region have experienced a nutritional transition in the past few decades as a result of growing urbanization and the globalization of the processed food supply (8). Associated dietary changes include decreased consumption of foods rich in fibre, such as legumes, fruits, vegetables and whole grains, and more frequent intake of processed foods, which are more likely to be energy-dense and rich in fats, sugars and salt (9) and are associated with weight gain and a greater frequency of NCDs. In particular, it has been shown consistently that industrially produced *trans*-fatty acids (TFAs) and sodium contribute to increasing the risk for cardiovascular disease (10). WHO is advocating complete elimination of TFAs from the global food supply (10), and public authorities in several countries have effectively banned or regulated their use (11). WHO also calls for a significant reduction in sodium intake (12). Most dietary intake of sodium is from salt added during the preparation and cooking of food or from processed foods, and initiatives to reduce intake take three main forms: product reformulation, raising public awareness and clear rules for product labelling. WHO recommends that the adult population take no more than 2 g of sodium per day, which corresponds to 5 g of salt (sodium chloride) per day, in order to lower their blood pressure and reduce their risk for cardiovascular disease (13). In most countries for which recent data are available, however, the dietary sodium intake is much higher (14). The intake of potassium, another key nutrient, is inversely associated with blood pressure, and WHO recommends a minimum daily intake of 3510 mg to reduce the risk for cardiovascular disease (15).

Few data are available on nutritional status, dietary habits and food composition in Kyrgyzstan. Nevertheless, representative surveys (1) indicate a steady increase in the prevalence of overweight and obesity, especially in urban areas, while the prevalence of childhood undernutrition (including wasting and stunting) has been decreasing or stable. In response to the finding that 74% of the population consumes fewer than five servings of fruit and vegetables per day (5), the Government of Kyrgyzstan is implementing a national programme for the prevention and control of NCDs between 2013 and 2020, which includes the promotion of healthy diets and means to decrease overweight and obesity throughout the life-course. The aims of a national action plan on food security and nutrition are to ensure the provision of healthy diets and to prevent obesity, particularly in school-aged children. Thus, the role of an unhealthy diet as a major risk factor for NCDs is clearly linked and integrated into the food and nutrition problem in the country. Kyrgyzstan authorities are also participating with United Nations agencies through international networks such as the "Scaling up nutrition" network.

Street food in Bishkek

FAO defines "street food" as "ready-to-eat foods and beverages prepared and/or sold by vendors or hawkers especially in the streets and other similar places" (16). Street food is a cultural, social and economic phenomenon typical of urbanized areas, where life is becoming more sedentary and the time dedicated to cooking at home is dramatically reduced (17). Street food may be an important component of the daily diet, particularly in countries where there are few supermarkets

and shops (18). It also plays an important community role, facilitates access to high-fibre foods rich in micronutrients (fruits and vegetables) and protects traditional foods and diets. Nevertheless, foods purchased from street vendors may provide significantly more energy and nutrients, although this aspect has received little study (19). More attention to the nutritional quality of foods available from street vendors and markets is therefore needed.

Dietary changes at population level are likely to be reflected in the urban street food environment, which, in turn, may be expected to influence dietary habits. It is therefore important in the prevention of NCDs to characterize and monitor patterns of street food offers and purchasing. Most research in low- and middle-income countries has been on hygiene and food security (19), and little is known about the nutritional value of street food. In Kyrgyzstan, there is generally little information on or routine surveillance of food composition and dietary habits, including the characteristics of street food.

Street trade has always been well developed in this region of the world, commonly in the typical Central Asia's bazaars. In Kyrgyzstan, food preferences and gastronomy reflect the multicultural background of people who travelled along the Silk Road and contributed to its culinary fabric (20). As in other street food environments, although traditional foods are likely to be widely available, new ingredients and foods processed by large-scale food manufacturers are becoming more prevalent (21).

Unlike in some other countries in which research has been conducted on street food (22), most street food vendors in Bishkek have semi-static or stationary vending units in city markets or their vicinity. Several of these markets are very large, some with 100–150 vendors. Commonly found foods include traditional homemade foods, many types of bread and traditional Kyrgyz noodle dishes. Many Korean salads are offered in Bishkek, reflecting Kyrgyzstan's multiple cultures. Locally prepared drinks are also sold.

Objectives

The aim of this study was to characterize the street food environment of urban Bishkek. The specific objectives were:

- to describe the characteristics of the vending sites;
- to characterize the food offered at selected vending sites; and
- to assess the TFA, sodium and potassium contents of ready-to-eat foods other than fruits sold in the street.

Methods

A cross-sectional evaluation of street food vending sites was conducted in Bishkek between 6 June and 21 July 2016. The study protocol was designed at the University of Porto 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.

Staff from the Regional Office and consultants recruited and trained local field researchers in conducting interviews over 5 days. The course was attended by eight women and two men. The training comprised lectures, demonstrations, practice interviews to pre-test the form for data collection in the office and in a pilot study conducted in one of the city markets that was not selected for the study.

Street food vending sites and food offered

Eligibility criteria

We adopted the definition of street food proposed by FAO (16), which includes both prepared (e.g. sandwiches, salads) or cooked (e.g. boiled eggs, traditional dishes) products and raw foods for immediate consumption (e.g. fruit, nuts), even if these products were sometimes bought to be consumed later (e.g. at home or at work).

Eligible vending sites were those that sold ready-to-eat food, including beverages and snacks, from a venue other than a permanent business or an establishment with four walls that did not sell directly to the street, operating in a predefined perimeter. Those eligible included both mobile vendors and sellers with semi-static or stationary vending units. Vending sites that sold only unprepared fresh fruit were not eligible.

Sampling of vending sites

As vending sites were concentrated predominantly in markets and their surroundings, for sampling, we started by identifying all public markets in Bishkek (Table 1) from information provided by local authorities and during a preliminary field visit. Ten public markets were randomly selected from the 19 identified, corresponding to approximately 50% of the markets in Bishkek. The sample comprised markets in three districts (Leninskiy, Pervomayskiy and Sverdlovskiy), of which five out of eleven sold mainly food products and five of eight sold food and other non-foodstuffs.

Table 1. Markets in which ready-to-eat food was sold in Bishkek

Name	District	Address	Types of items sold
Osh Bazaar	Pervomayskiy	20 Beishenalieva St	Food and miscellaneous
Orto-Sai	Oktyabrskiy	7 Microregion, Jukeey-Pudovkin St	Food and miscellaneous
Alamedin	Sverdlovskiy	150 Jibek Jolu St	Food and miscellaneous
Chinaar	Sverdlovskiy	11 Auezov St	Mainly food
Dordoi–Dyikan	Pervomayskiy	308 Deng Xiaoping St	Food and miscellaneous
Dordoi	Sverdlovskiy	115 Ibraimov St	Food and miscellaneous
Teelek	Oktyabrskiy	9 Microregion	Mainly food
Asanbai	Oktyabrskiy	Microregion Asanbi	Mainly food
Aziz/Bayat	Pervomayskiy	201 Mahatma Gandhi St	Food (Aziz)/wholesale market (Bayat)
Zhumushchu	Leninskiy	Gagarin St / 74 Nekrasov St	Mainly food
Bereket–Universal	Leninskiy	Kiev St / Kuliev St	Food and miscellaneous
Booruker	Leninskiy	10 Deng Xiaoping St	Mainly food
Cholpon	Sverdlovskiy	Microregion “Alamedin - 1”, Kolbaev St	Mainly food
Ular	Sverdlovskiy	Microregion Vostok - 5	Mainly food
Ak-Emir	Sverdlovskiy	78/1, Moskovskaya St	Mainly food
Talalai	Sverdlovskiy	117, Chui Avenue/ T. Aitmatov St	Mainly food
Adour	Sverdlovskiy	64, Coniferous	Mainly food
Almaluu	Sverdlovskiy	Osmonkulov St / J. Joly St	Mainly food
Kok-Sai	Pervomayskiy	Orozbekova St	Food and construction materials

Selected markets are in bold.

For each of the markets selected, we defined a 500-m zone around its centre as the study area.

The markets were evaluated on consecutive days, in the order in which they are presented in Table 1. Pairs of field researchers canvassed each study area for street food vendors by entering the market through the main entrance and walking through any publicly accessible street in the selected area. After canvassing the whole market, they moved to the surroundings included in the study area. After registering the GPS coordinates of each vending site, they approached the

vendors, explained the study objectives and procedures and asked for their general oral consent to participate in data collection. When the vendor agreed, the interviewers administered the structured questionnaire (approximately 10 min) on food vending activity and the food offered. In markets that had more than 100 eligible vending sites, one in every two vending sites was systematically evaluated, although all the sites were mapped. Of a total of 1220 eligible street food vendors, 608 were approached, and 600 agreed to participate (98.7% participation).

In order to avoid interviewing the same vendor twice and to facilitate recognition of vendors who had already been approached, a sticker with the logo of the research project was attached to the vending site, with the vendor's consent. The researchers were instructed to answer any questions the vendors had about the purposes of the study, and leaflets describing the study were available.

Characterization of vending sites and food offered

The data collected by direct observation included certain characteristics of the food vendors (sex and ownership), whether the vending sites were mobile or stationary and the type of site (e.g. stand, van, cooler). The characteristics of the businesses (e.g. working days, number of employees, access to clean water and electricity) were recorded after direct observation and face-to-face interviews.

Data were also collected on the ready-to-eat foods offered (e.g. type of food product, size of portions, preparation and packaging). The types were grouped as:

- fruit: fresh or dried products;
- foods other than fruit: all foods other than fruit and beverages; and
- beverages: any alcoholic or non-alcoholic drink.

Foods other than fruit and beverages were further classified as homemade (cooked and/or prepared at home or in the street, even if industrial ingredients were used) or industrial (produced by the food industry and sold without modification). Beverages were classified into: soft drinks, water, fruit juice-based drinks, fresh fruit juice, milk, alcoholic beverages, energy drinks, coffee, tea and other.

Analysis of street foods

Selection, collection and processing of food samples

After characterization of the vending sites and the food offered, four samples each of the 20 most frequently available homemade foods and the 10 most frequently available industrial foods, including traditional beverages of unknown composition, were selected for analysis, for a total of 120 samples. Common drinks of known nutritional composition, such as coffee, tea, milk and soft drinks, were not analysed. The samples collected corresponded to one unit or the usual dose sold. The samples of foods sold in small portions (e.g. small snacks, biscuits) contained more than one unit, corresponding to the usual purchasing or consumption pattern. Example of each of the foods sampled are shown in the annexes.

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

Samples of two sets of homemade and two sets of industrial food were collected for 10 consecutive days, including weekends, in each market, starting with the market with the fewest eligible vendors (Table 3). Each day, 12 samples of food were collected, until 120 samples had been accrued.

Table 2. Definition of food sample sets

Homemade foods	Set	Industrial foods	Set	Homemade foods	Set	Industrial foods	Set
1	A	1	F	16	D		
2		2		17			
3		3	18				
4		4	19				
5		5	20				
6	B	6	H	21	E		
7		7		22			
8		8		23			
9		9		24			
10		10		25			
11	C						
12							
13							
14							
15							

Table 3. Food sampling randomization scheme

Day	Market	Homemade		Industrial	
1	Aziz/Bayat	A	B	F	G
2	Zhumuschu	C	D	H	I
3	Almaluu	E	A	J	F
4	Cholpon	B	C	G	H
5	Kok-Sai	D	E	I	J
6	Chinaar	A	B	F	G
7	Ak-Emir	C	D	H	I
8	Bereket–Universal	E	A	J	F
9	Alamedin	B	C	G	H
10	Dordoi	D	E	I	J

The vending sites at which food samples were collected were selected by the random route procedure, starting with a random selection of GPS coordinates in each study area, from which the researchers moved northwards, then clockwise towards the east, continuing through to the south and west to the limits of the study area or to a physical barrier (e.g. wall, canal), until they reached vending sites at which the selected foods were available. In each market and on each collection day, only one food sample was collected from the same vendor, the most common foods being selected first.

Four representative aliquots of each sample were homogenized or ground mechanically, weighed and packed individually in labelled, rigid plastic containers. After packaging, each container was weighed again and stored in a freezer (at $-18\text{ }^{\circ}\text{C}$) until analysis. Before analysis, the samples were defrosted, and their weight was compared with that before freezing to detect moisture loss during storage and shipping. They were then homogenized and analysed for TFA, sodium and potassium content. For analysis of TFA, the fat fraction was extracted from the food with organic solvents, and a portion was converted to fatty acid methyl esters and separated by gas chromatography, as described elsewhere (23). Sodium and potassium were analysed by flame photometry according to the method of Vieira et al. (24).



Statistical analysis

The street food environment was characterized overall, by district and in the 10 markets by descriptive statistics and spatial analysis. The locations of the vending sites were mapped, and their characteristics and those of the food they sold are presented as proportions.

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

Results

Distribution of selected markets and vending sites

Fig. 1 shows the distribution of the selected markets and street food vending sites in Bishkek. Figs 2–11 show the 500-m zone of each market and the vending sites identified in each. Within each market, the distribution of the vending sites depended on the configuration and type of market and ranged from those predominantly concentrated in specific market sections, as in the Almalulu, Ak-Emir, Cholpon and Zhumushchu markets, to those scattered across wider areas, as in the Alamedin, Aziz/Bayat, Bereket–Universal, Chinaar, Dordoi and Kok-Sai markets.

Fig. 1. Selected markets and street food vending sites in Bishkek, Kyrgyzstan

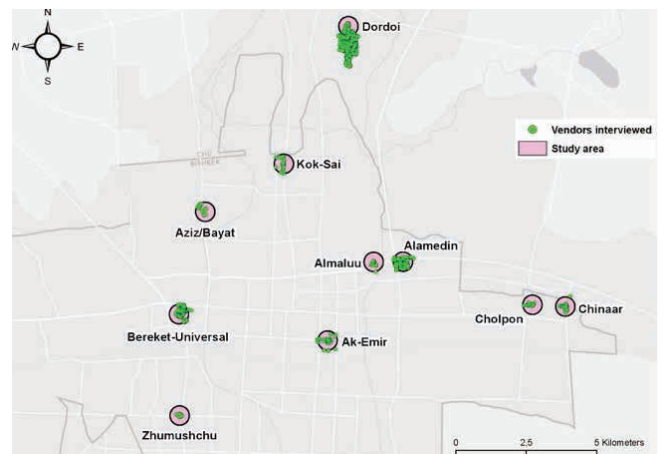


Fig. 2. Alamedin market zone and street food vending sites evaluated

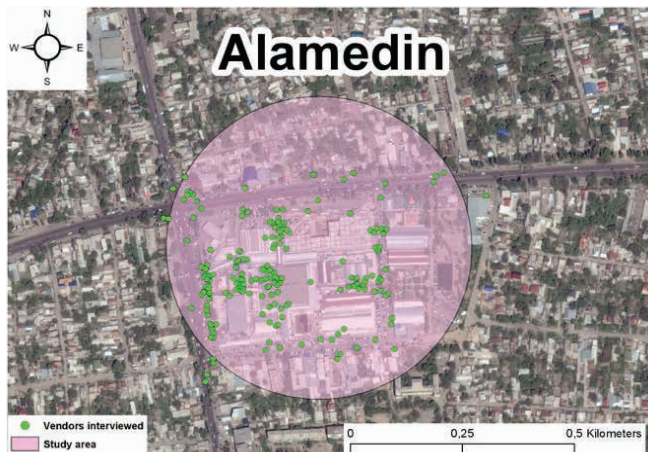


Fig. 5. Aziz/Bayat market zone and street food vending sites evaluated

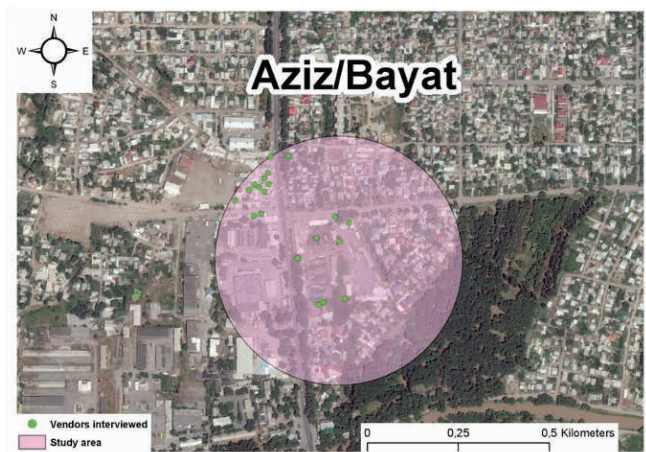


Fig. 3. Chinaar market zone and street food vending sites evaluated

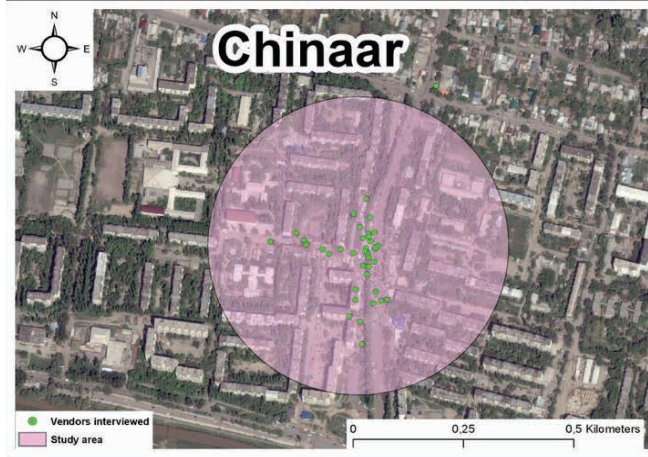


Fig. 6. Zhumushchu market zone and street food vending sites evaluated

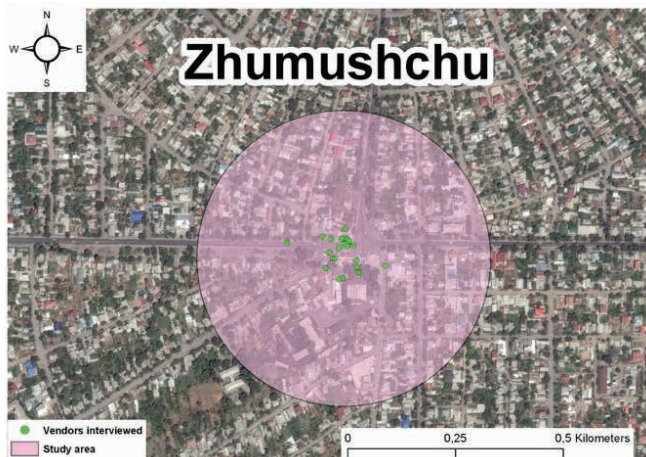


Fig. 4. Dordoi market zone and street food vending sites evaluated

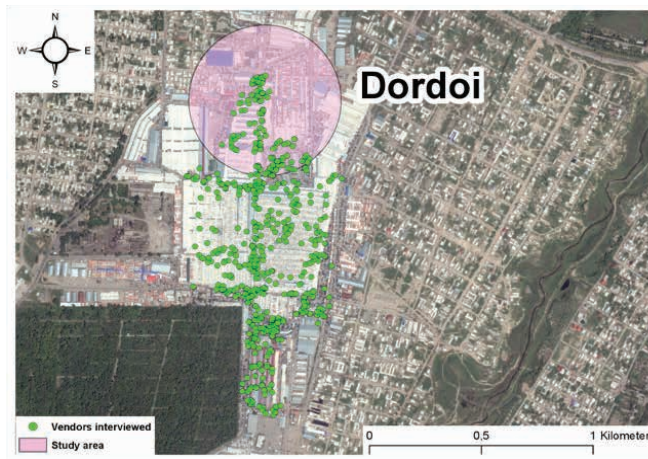


Fig. 7. Bereket-Universal market zone and street food vending sites evaluated

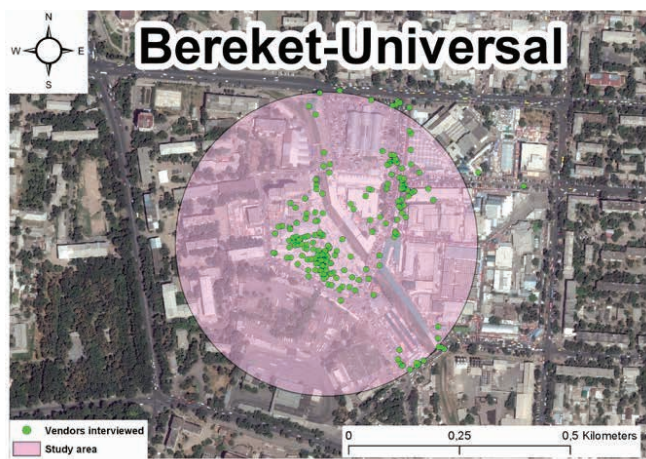


Fig. 8. Cholpon market zone and street food vending sites evaluated

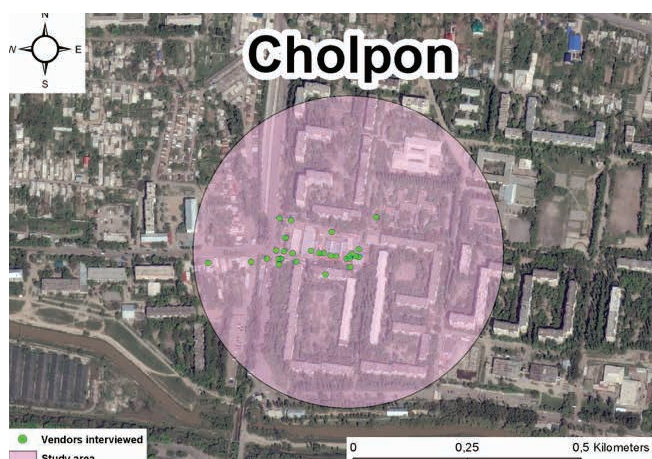


Fig. 10. Kok-Sai market zone and street food vending sites evaluated

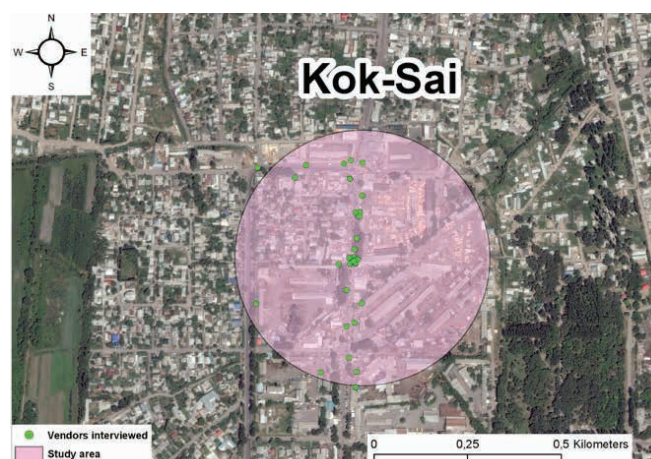


Fig. 9. Ak-Emir market zone and street food vending sites evaluated

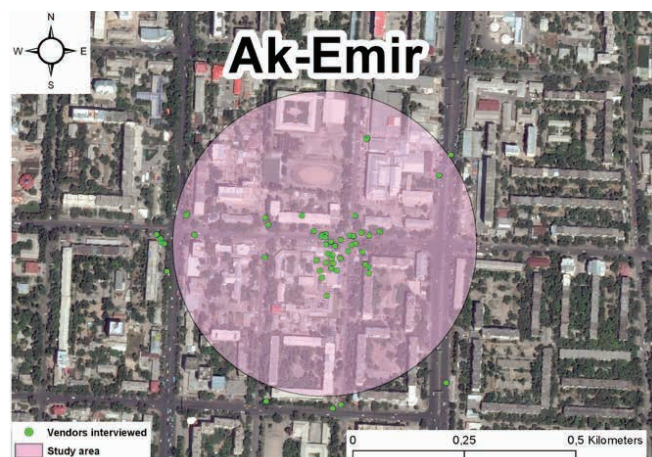
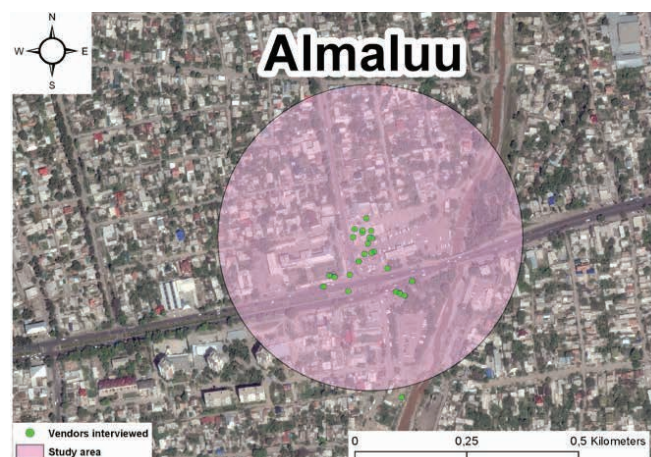


Fig. 11. Almaluu market zone and street food vending sites evaluated



Characteristics of vendors and vending sites

The characteristics of the street food vendors are summarized in Table 4. Most were women (77.8%), operated a stationary vending site (72.7%) and owned their business (54.5%). Most of the street food vendors interviewed were in the Sverdlovskiy district (78.0%).

Table 4. Characteristics of 600 street food vendors, overall and by district

Characteristic	Total (%)	By district (%)		
		Leninskiy (n = 106)	Pervomayskiy (n = 26)	Sverdlovskiy (n = 468)
Sex				
Female	77.8	79.2	69.2	78.0
Male	22.2	20.8	30.8	22.0
Type of vendor				
Stationary	72.7	84.0	92.3	69.0
Mobile	27.3	16.0	7.7	31.0
Owner				
Yes	54.5	50.0	38.5	56.4
No	45.5	50.0	61.5	43.6

The stationary vending sites (72.7%; n = 436) were of several types (Table 5). The most prevalent was a stand, stall or booth (35.3%), followed by *dukoni* (23.2%), which is a restaurant serving traditional fast food directly onto the street through an open window. A stand, stall or booth was the most common in every district (53.9% in Leninskiy and 31.3% in Sverdlovskiy) except Pervomayskiy (20.8%), in which a table with chairs for customers was the most frequent (37.5%).

Table 5. Physical characteristics 436 stationary vending sites, overall and by district

Characteristic	Total (%)	By district (%)		
		Leninskiy (n = 89)	Pervomayskiy (n = 24)	Sverdlovskiy (n = 323)
Stand, stall or booth	35.3	53.9	20.8	31.3
<i>Dukoni</i> ^a	23.2	10.1	33.3	26.0
Table with chairs for customers	19.0	18.0	37.5	18.0
Cooler ^b	8.7	11.2	0.0	8.7
Bench with board	7.3	3.4	0.0	9.0
Push cart	3.7	3.4	0.0	4.0
Van	2.1	0.0	0.0	2.8
<i>Tandoor</i> ^c	0.7	0.0	8.3	0.3

^a A restaurant serving traditional fast food directly onto the street through an open window.

^b These vending sites frequently sold ice cream, lemonade and other beverages.

^c Wood- or charcoal-fired clay oven.

Almost all the street food vendors had access to a toilet (97.2%), and 95.5% of the stationary vending sites had access to clean water. When stationary vendors were asked where they usually washed their hands during the work day, 78.9% replied “bathroom”, and 16.7% replied “basin”. Six of the vendors reported they had nowhere to wash their hands. Vendors at 7 of every 10 stationary sites reported having access to electricity. Most stationary vendors reported that they sold food throughout the week (82.8%) and during all four seasons (71.6%), regardless of the weather (74.5%).

Characteristics of street food offered

Fruit was available at 4.4% (mobile: 2.4%, stationary: 5.1%) and beverages at 61.6% of the vending sites (mobile: 59.8%, stationary: 62.3%). Foods other than fruit were sold at 85.5% of the sites (mobile: 90.2%, stationary: 83.7%). The distribution of types of street food sold in each district was similar to the overall distribution (Table 6). Vending sites selling only homemade food were more frequent (mobile: 64.1%, stationary: 53.8%) than those selling only industrial foods (mobile: 13.1%, stationary: 23.1%). Both homemade and industrial foods were sold at 22.8% of mobile and 23.1% of stationary sites. The food offered varied by district. In Pervomayskiy, 4.6% of the vending sites sold only industrial foods and 81.8% only homemade foods, whereas the Leninskiy district had the lowest proportion of sites selling only homemade foods (39.8%) and the highest proportion selling only industrial products (25.3%).

Table 6. Food offered at 600 street vending sites by type of vendor and district

Food offered	Total (%)		By district (%)		
	Mobile (n = 164)	Stationary (n = 436)	Leninskiy (n = 106)	Pervomayskiy (n = 26)	Sverdlovskiy (n = 468)
Fruit	2.4	5.1	2.8	3.8	4.7
Food other than fruit	90.2	83.7	80.2	84.6	86.8
Industrial	13.1	23.1	25.3	4.6	19.8
Homemade	64.1	53.8	39.8	81.8	59.3
Homemade and industrial	22.8	23.1	34.9	13.6	20.9
Beverages	59.8	62.3	57.6	57.7	62.7

The most common homemade foods sold in the streets of Bishkek were *samsa* (28.5%), *kurut* (20.8%), *piroshky* (22.7%) and sausage rolls (12.7%). Table 7 lists the main characteristics of the preparation, packaging and storage temperature of these foods. *Samsa* and sausage rolls were usually prepared on the same day at all vending sites, while *piroshky* were usually cooked 1 day before (98.0%) and *kurut* more than 2 days before (90.4%) being sold. Overall, most of these foods were prepared at the vending site (range, 60.6% for sausage rolls and 74.0% for *samsa*), while *kurut* was usually bought from another vendor or shop (84.6%). Most stationary vending sites sold foods manufactured by employees (range, 9.6% for *kurut* and 88.0% for *piroshky*) and unpackaged (range, 76.9% for *kurut* and 90.9% for sausage rolls). Generally, foods were stored at room temperature (range, 53.4% for *samsa* and 100% for *kurut*).

Table 7. Characteristics of a sub-sample of the most common homemade foods offered at stationary vending sites

Characteristic (n, %)	<i>Samsa</i> ^a (n = 73)	<i>Kuruta</i> (n = 52)	<i>Piroshkya</i> (n = 51)	Sausage roll (n = 33)
Day of preparation				
Same day	73 (100)	1 (1.9)	1 (2.0)	33 (100.0)
1 day earlier	–	–	50 (98.0)	–
2 days earlier	–	4 (7.7)	–	–
More than 2 days earlier	–	47 (90.4)	–	–
Place of preparation				
At home	1 (1.4)	8 (15.4)	3 (5.9)	–
At the vending site	54 (74.0)	–	35 (68.6)	20 (60.6)
Both at home and at the vending site	14 (19.2)	–	1 (2.0)	–
Bought from another vendor or shop	4 (5.5)	44 (84.6)	9 (17.6)	11 (33.3)
Restaurant or cafeteria	–	–	3 (5.9)	2 (6.1)
Food preparer				
Employees	60 (82.2)	5 (9.6)	44 (88.0)	28 (84.9)
Owner	1 (1.4)	–	–	–
Relatives	3 (4.1)	3 (5.8)	1 (2.0)	1 (3.0)
Factory	2 (2.7)	1 (1.9)	–	1 (3.0)
Bakery	–	–	–	–
Imported	–	–	–	–
Does not know	7 (9.6)	43 (82.7)	5 (10.0)	3 (9.1)
Packaging				
Industrial	–	–	–	–
Manual	9 (12.3)	12 (23.1)	8 (15.7)	3 (9.1)
None	64 (87.7)	40 (76.9)	43 (84.3)	30 (90.9)
Storage temperature at time of selling				
Cold	–	–	–	–
Warm	34 (46.6)	–	14 (27.4)	9 (27.3)
Room temperature	39 (53.4)	52 (100)	37 (72.6)	24 (72.7)

^a Traditional homemade snacks: *samsa* (also known as *sambusa* or *samosa*) is a baked puff pastry usually filled with ground meat (lamb, beef or chicken) and vegetables, wrapped in flaky pastry or bread; *kurut* is a salty, dairy-based snack, made by straining and drying sour milk or yoghurt; *piroshky* are buns made from yeast dough, commonly stuffed with meat (typically beef) or vegetables.

Beverages

A wide variety of beverages was available at both stationary and mobile vending sites in Bishkek (Table 8). The beverages most commonly sold were tea (57.5%), soft drinks (56.2%), water (43.3%) and coffee (33.7%). Many other beverages were

also sold, which were mainly the traditional beverages *kompot* (13.4%), *maksym* (12.1%), *chalap* (9.9%), *ayran* (3.0%) and *jarma* (2.5%). Alcoholic beverages were available at about 1 of 10 vending sites. Bottled water was sold at both mobile and stationary vending sites (98.1%).

In Pervomayskiy, water and alcoholic beverages accounted each for 20.0% of the beverages sold. Other beverages and milk were more often available in Pervomayskiy than in other districts (66.7% and 6.7% of the vending sites, respectively) (Table 8).

Table 8. Types of beverages offered at 365 stationary vending sites, overall and by district

Type of beverage (%)	Total (%) (n=365)	Vending sites selling beverages, by district (%)		
		Leninskiy (n = 60)	Pervomayskiy (n = 15)	Sverdlovskiy (n = 290)
Tea	57.5	43.3	60.0	60.3
Soft drinks	56.2	50.0	40.0	58.3
Water	43.3	41.7	20.0	44.8
Coffee	33.7	18.3	40.0	36.6
Fruit juice-based drink	33.2	30.0	20.0	34.5
Other beverages ^a	26.9	26.7	66.7	24.8
<i>Kompot</i>	13.4	8.3	26.7	13.8
<i>Maksym</i>	12.1	16.7	66.7	8.3
<i>Chalap</i>	9.9	16.7	20.0	7.9
<i>Ayran</i>	3.0	1.7	0.0	3.5
<i>Jarma</i>	2.5	0.0	6.7	2.8
Alcoholic beverages ^b	11.0	10.0	20.0	10.7
Energy drinks	3.6	3.3	0.0	3.8
Milk	2.2	1.7	6.7	2.1
Fresh fruit juice	0.8	1.7	0.0	0.7

^a *Kompot* is a homemade beverage obtained by cooking fruit in a large volume of water, often with sugar or raisins; *maksym* is a fermented beverage made from grain, usually malt (usually industrial); *chalap* is made from fermented milk, salt and carbonated water; *ayran* is a fermented beverage made from sheep's milk; *jarma* is a homemade beverage made from crushed wheat by means of its fermentation.

^b Includes some traditional beverages with a low alcohol content, such as *kvass*, a fermented beverage made from rye bread; *bozo*, a fermented beverage made from millet; and *kymyz*, a fermented product made from mare's milk

Nutritional composition of street foods

The nutritional composition of the 30 most commonly available foods other than fruit that were collected in the streets of Bishkek is shown in Table 9. The food products analysed included traditional dishes and drinks, fast food, pastries and snacks. The TFA, sodium and potassium contents varied widely, with high levels of TFAs and sodium in both industrial and homemade foods.

The mean TFA content per serving was highest in industrial wafers (3.78 g), homemade *manty* (2.86 g), homemade *samsa* (1.57 g) and homemade cake (0.76 g), corresponding to 170.4%, 128.9%, 70.8% and 34.6% of the recommended maximum daily intake. The mean TFA content per serving was lowest in industrial dried breadcrumbs (0.01 g), homemade *kompot* (0.01 g), home-cooked corn (0.01 g) and homemade bread (0.01 g), corresponding to 0.7%, 0.6%, 0.4% and 0.4% of the recommended maximum daily intake, respectively.

The highest mean sodium content per serving was found in the following homemade foods: *lagman* (1980 mg), *ashlyamfu* (1687 mg), *manty* (1658 mg) and carrot salad (1400 mg), corresponding to 99.0%, 84.4%, 82.9% and 70.0% of the recommended maximum daily intake, respectively. The lowest mean sodium contents per serving were observed in industrial sweet pastries (65 mg), industrial chocolate (39 mg), industrial corn snacks (19 mg) and homemade *kompot* (4 mg), corresponding to 3.3%, 1.9%, 0.9% and 0.2% of the recommended maximum daily intake, respectively. *Kurut*, a

traditional dairy product eaten mainly by children and young people several times a day, contained 23 g of sodium in a single portion, accounting for 58.1% of the recommended maximum daily intake.

The mean potassium content per serving was highest in the following homemade foods: *lagman* (645 mg), hamburger (634 mg), corn (571 mg) and *manty* (554 mg), corresponding to 18.4%, 18.0%, 16.2% and 15.8% of the recommended minimum daily intake. The mean potassium content per serving was lowest in the following industrial foods: *maksym* (51 mg), buns (47 mg), biscuits (43 mg) and sweet pastries (38 mg), corresponding to 1.5%, 1.3%, 1.2% and 1.1% of the recommended minimum daily intake.

These results show that a number of street foods available in Bishkek are nutritionally inadequate. For example, a single portion of industrial wafers or homemade *manty* provides more than the recommended maximum daily intake of TFAs. A serving of *manty* also accounts for 82.9% of the maximum daily sodium intake. Traditional pastries and main dishes and traditional (e.g. *lagman*, *ashlyamfu*, carrot salad) and western (e.g. hamburger, hot dog) foods had a high sodium content, corresponding to over 50% of the recommended maximum daily intake. In contrast, the street foods analysed generally provided only low proportions of the recommended daily potassium intake.

In general, the traditional beverages analysed (*chalap*, *maksym* and *kompot*) had low TFA and potassium contents, but a high sodium content per serving of 200 mL was observed in the industrial beverages analysed, corresponding to 25.0% (*maksym*) and 32.9% (*chalap*) of the recommended maximum daily intake of this nutrient.

Conclusions and policy implications

Street food is abundant in Bishkek and was available in all the markets in the city that were evaluated. Of the 600 eligible vendors interviewed, most were women, worked in stationary vending sites and owned their business. Basic sanitary conditions were accessible for most stationary vendors.

Fruit was sold at 4.4 % of the eligible street food vending sites, while foods other than fruit were sold at 85.5% and beverages at 61.6%. Although the availability of fruit may not be accurately reflected, as vending sites selling only unprepared fresh fruit were not included in the study sample, the availability to the urban population of Bishkek of nutritionally dense foods rich in fibre and sources of potassium such as fruit and vegetables should be increased in markets and other sources of street food.

Many types of beverages were sold in the streets, although soft drinks were the most common, being found at over 50% of all vending sites selling beverages; this suggests an increasing influence of the western diet. This is a concern, in view of the high sugar content of soft drinks, which is known to be the main source of added sugar in the diet in other countries (25) and probably contributes to excess energy intake and weight gain. WHO recommends a reduced intake of free sugars throughout the life-course (25).

Homemade foods were offered more often than industrial foods by street vendors. The 30 foods most commonly found in the streets of Bishkek included traditional dishes and drinks and various types of cakes, pastries and snacks. The highest levels of sodium were found in homemade foods, and some traditional and western homemade foods accounted for over 50% of the daily recommended level of sodium. Two of these foods were carrot salad, which is considered to be healthy, and *kurut*, a traditional dairy product eaten frequently by children. Therefore, the awareness of food vendors about adding excess salt during cooking and food preparation should be raised. Two of the traditional industrial beverages analysed, *maksym* and *chalap*, were also found to contain significant levels of sodium. Regulation for reformulation of industrial processed foods could decrease their sodium content. High TFA levels per serving were found in both homemade and industrial foods (e.g. wafers, cakes, *manty*, *samsa*), sometimes exceeding the maximum daily recommended level in one serving. This is also a concern, as most of these foods are eaten regularly throughout the day, possibly resulting in excessive intake of substances that are clearly harmful to health.

Table 9. Nutritional composition of the street food samples from markets in Bishkek

Food	Mean serving size (g or mL)	TFA		Na		K	
		Mean (min–max) g/serving	% of recommended	Mean (min–max) g/serving	% of recommended	Mean (min–max) g/serving	% of recommended
<i>Industrial foods</i>							
Buns	45	0.07 (0.02–0.15)	3.3	127 (5–381)	6.3	47 (37–65)	1.3
Chalap	200	0.08 (0.02–0.21)	3.8	658 (492–986)	32.9	79 (57–115)	2.2
Crisps	23	0.02 (0.01–0.02)	0.8	98 (83–118)	4.9	189 (153–244)	5.4
Chocolate	42	0.47 (0.10–1.24)	21.5	39 (11–59)	1.9	84 (70–100)	2.4
Biscuits	34	0.62 (0.01–1.10)	28.0	76 (4–136)	3.8	43 (31–53)	1.2
Corn snacks	38	0.05 (0.02–0.08)	2.4	19 (9–41)	0.9	52 (25–68)	1.5
Dried breadcrumbs	34	0.01 (0.01–0.03)	0.7	434 (306–528)	21.7	70 (65–82)	2.0
Maksym	200	0.02 (0.01–0.05)	1.1	500 (432–587)	25.0	51 (42–56)	1.5
Sweet pastries	34	0.19 (0.01–0.27)	9.0	65 (43–86)	3.3	38 (17–79)	1.1
Wafers	83	3.78 (0.25–8.30)	170.4	88 (33–139)	4.4	116 (88–144)	3.3
<i>Homemade foods</i>							
Ashiyamfu	520	0.12 (0.04–0.20)	5.4	1687 (913–2639)	84.4	301 (161–478)	8.6
Belyashi	162	0.29 (0.17–0.45)	13.2	966 (798–1188)	48.3	190 (131–219)	5.4
Bread	120	0.01 (0.00–0.01)	0.4	720 (521–867)	36.0	135 (117–149)	3.9
Buns	66	0.14 (0.01–0.29)	6.6	132 (115–157)	6.6	91 (63–116)	2.6
Cake	170	0.76 (0.04–1.33)	34.6	490 (402–590)	24.5	148 (79–180)	4.2
Chebureki	135	0.40 (0.26–0.58)	18.3	427 (295–532)	21.4	169 (130–190)	4.8
Corn	278	0.01 (0.00–0.01)	0.4	561 (66–1848)	28.0	571 (380–645)	16.2
Hamburger	245	0.69 (0.37–1.22)	31.3	1158 (786–1673)	57.9	634 (193–1187)	18.0
Hot dog	283	0.44 (0.27–0.65)	19.9	1346 (1129–1858)	67.3	473 (368–632)	13.5
Keksi	75	0.15 (0.05–0.45)	7.1	203 (124–323)	10.2	78 (33–123)	2.2
Kompot	200	0.01 (0.00–0.02)	0.6	4 (0–15)	0.2	82 (13–122)	2.3
Kurut	23	0.06 (0.03–0.08)	2.7	1161 (822–1503)	58.1	71 (52–97)	2.0
Lagman	603	0.53 (0.12–1.31)	24.1	1980 (1135–2604)	99.0	645 (446–856)	18.4
Manty	430	2.86 (1.55–4.13)	128.9	1658 (1289–2199)	82.9	554 (481–650)	15.8
Piroshky	106	0.24 (0.12–0.40)	10.7	480 (141–905)	24.0	155 (90–218)	4.4
Porridge	249	0.12 (0.06–0.16)	5.5	321 (241–411)	16.1	145 (98–164)	4.1
Salad (carrot)	212	0.06 (0.01–0.09)	3.0	1400 (741–2367)	70.0	544 (433–796)	15.5
Sarnisa	176	1.57 (0.50–2.30)	70.8	861 (195–1424)	43.1	253 (120–407)	7.2
Sandwich	138	0.37 (0.14–0.49)	17.0	730 (443–962)	36.5	162 (107–223)	4.6
Sausage roll	103	0.11 (0.07–0.16)	5.1	568 (407–797)	28.4	124 (92–184)	3.5

Percentages of WHO recommended levels were computed for an average adult with an intake of 2000 kcal. WHO recommendations: TFA: < 1% total energy value/day (10); Na: < 2000 mg/day (13); K: ≥ 3510 mg/day (15)

These results show that promotion of healthy diets should be a priority and be integrated into wider action for food security and nutrition in the country. Salt and TFAs could be strategic starting-points. Practical policy actions to move towards a healthier street food environment should be incorporated into existing programmes such as the national NCD programme and the national food security and nutrition programme to strengthen the promotion of healthy diets and the prevention of obesity.

Kyrgyzstan might therefore consider the policy opportunities listed below.

Short term

- give additional prominence to promoting healthy diets and preventing obesity in existing programmes on NCDs, food security and nutrition, emphasizing salt reduction, TFA elimination and increasing potassium;
- extend work on healthy diets into other relevant sectors, such as health and agriculture, as recommended in the national food security and nutrition programme;

Medium term

- define priority actions to respond to the excess salt and TFAs and low potassium in foods and address the widespread availability of sugary drinks. Such actions could include setting targets and/or maximum limits on the salt content of some products; enforcing legislation on TFAs and monitoring compliance; improving labelling of foods; restricting the availability of sugary drinks in the vicinity of schools and other educational establishments; increasing the consumption of potassium-rich foods by promoting the availability of preparations of pulses, fruit and vegetables; and

Longer term

- expand national capacity to monitor the composition of foods and compliance with regulations, including routine sampling and analysis of local and imported foods.

Reducing the salt and TFA contents of ready-to-eat foods sold at street vending sites will probably require a multi-pronged approach. One aspect would be health promotion to educate street food vendors to use less salt and healthier fats and also to raise awareness among the public that these foods can harm their health if consumed in excess. A second, increasingly important aspect in the changing food environment of Kyrgyzstan is the leadership and regulatory role of the Government. The Government could adopt salt reduction targets for industrially produced foods (e.g. savoury snacks, bread and drinks) by setting maximum limits through regulation, as has been done in many countries, including Finland, Greece and Turkey, and most comprehensively in Argentina and South Africa (26). The regulation would apply to all foods available on the market, including in supermarkets, and thus ensure equal treatment. Such a regulation would be consistent with and complementary to changes in legislation for food security and nutrition and would not undermine other initiatives, such as salt iodization.

With regard to TFAs in food, Kyrgyzstan, through its membership in the Eurasian Economic Union, has already adopted a regulation on fats and oils in food products that will prohibit a TFA content greater than 2 g/100 g of fat by 2018. This study demonstrates that progress will be required to achieve compliance by 2018, and repeated monitoring will be necessary after that deadline. A good example of the use of monitoring to ensure compliance with legislation is provided by Denmark, which introduced a ban on TFAs in food in 2003 (27).

In order to ensure compliance, the Government might consider taking measures to encourage processors, manufacturers and vendors to shift to healthier oils. Street vendors and small-scale manufacturers are extremely price conscious, given the nominal profit they make, and their choice of cooking fat is likely to be influenced by price. Increasing the availability and affordability of healthier oils for use by street vendors and manufacturers (e.g. in frying or in pastry preparation) could significantly change dietary intake, as observed in other contexts (28). For example, the “Healthier Hawker Food Programme” in Singapore improved the availability of and access to healthier oils by bulk purchasing and improved the logistics of supply to street vendors. This in return reduced the price and encouraged vendors to change to healthier

vegetable oils (28). Support to the agri-business sector within the food security and nutrition programme could be leveraged in this case.

The nutritional information on packaged foods in Kyrgyzstan could be revised, to ensure that all products bear a declaration of nutrients, including sodium, in addition to a list of ingredients.

Such policies require not only government leadership but also regular monitoring. An important starting-point for both salt reduction and TFA elimination will be mapping of local food suppliers (e.g. manufacturers of oils and fats used in freshly prepared products, wholesale producers, manufacturers of breads, pastries and confectionery, savoury snacks, drinks and processed meats) in order to engage them and monitor compliance with regulations and guidelines. Mapping of this kind was used in India, for example, to explore the barriers to and opportunities for reducing TFAs in order to comply with Government policy (29). Contact with international food suppliers will also be important, and perhaps the nutritional composition of foods consumed within the Eurasian Economic Union should be the topic of international discussions.

All these activities would contribute significantly to the promotion of healthy diets and the prevention of obesity in Kyrgyzstan. The national programmes on NCDs and on food security and nutrition would be suitable entry points for such policies and would ensure multisectoral action, in view of the number of ministries and agencies already involved in implementing these programmes.

This study shows that there is considerable room for improvement in the nutritional adequacy of street food sold in Bishkek. It highlights the need for health policies to enhance the nutritional quality of street food while protecting its cultural and community role, in order to prevent the occurrence of diet-related NCDs in this country and also address other forms of malnutrition. Regulating production and promoting the population's access to safe, affordable, nutritious street foods is essential for preventing NCDs and associated health disparities in the urban environment.

The initial findings of this study were discussed at a joint policy dialogue between the Ministry of Health and the WHO Regional Office for Europe in Bishkek in late 2016. It is to be hoped that this report will serve as the basis for further discussion, capacity-building and policy development.



References

1. Kyrgyz Republic Demographic and Health Survey 2012. Bishkek: National Statistical Committee and Ministry of Health; Calverton (MD): ICF International; 2013 (<https://dhsprogram.com/pubs/pdf/FR283/FR283.pdf>, accessed 21 August 2017).
2. Kyrgyzstan 2016. Washington DC: World Bank; 2016 (<http://data.worldbank.org/country/kyrgyz-republic>, accessed 21 August 2017).
3. United Nations data retrieval system. New York (NY): United Nations; 2017 (<http://data.un.org/Data.aspx?d=POP&f=tableCode%3A240>, accessed 21 August 2017).
4. Country health profile: Kyrgyzstan. Geneva: World Health Organization; 2015 (<http://www.who.int/countries/kgz/en/>, accessed 21 August 2017).
5. STEPS Survey 2013: Kyrgyzstan fact sheet. Copenhagen: WHO Regional Office for Europe; 2013.
6. Better noncommunicable disease outcomes: challenges and opportunities for health systems. Kyrgyzstan country assessment. Copenhagen: WHO Regional Office for Europe; 2014.
7. Global burden of disease 2015. Seattle (WA): Institute for Health Metrics; 2017 (<https://vizhub.healthdata.org/gbd-compare/>, accessed 21 August 2017).
8. Europe and Central Asia. Regional overview of food insecurity. Rome: Food and Agriculture Organization of the United Nations; 2017.
9. Popkin BM. Contemporary nutritional transition: determinants of diet and its impact on body composition. *Proc Nutr Soc.* 2011;70:82–91.
10. Uauy R, Aro A, Clarke R, Ghafoorunissa, L'Abbe MR, Mozaffarian D et al. WHO scientific update on trans fatty acids: summary and conclusions. *Eur J Clin Nutr.* 2009;63(Suppl.2):S68–75.
11. Downs SM, Thow AM, Leeder SR. The effectiveness of policies for reducing dietary trans fat: a systematic review of the evidence. *Bull World Health Organ.* 2013;91:262–9.
12. The SHAKE technical package for salt reduction. Geneva: World Health Organization; 2016.
13. Guideline: sodium intake for adults and children. Geneva: World Health Organization; 2012.
14. Mozaffarian D, Fahimi S, Singh GM, Micha R, Khatibzadeh S, Engell RE et al. Global sodium consumption and death from cardiovascular causes. *N Engl J Med.* 2014;371:624–34.
15. Guideline: potassium intake for adults and children. Geneva: World Health Organization, 2012.
16. Street foods. Report of an FAO expert consultation. *FAO Food Nutr Pap.* 1989;46:1–96.
17. Popkin BM. Urbanization, lifestyle changes and the nutrition transition. *World Dev.* 1999;27:1905–16.
18. Global food policy report. Washington DC: International Food Policy Research Institute; 2017.

19. Steyn NP, McHiza Z, Hill J, Davids YD, Venter I, Hinrichsen E et al. Nutritional contribution of street foods to the diet of people in developing countries: a systematic review. *Public Health Nutr.* 2014;17:1363–74.
20. Pirastu N, Robino A, Lanzara C, Athanasakis E, Esposito L, Tepper BJ et al. Genetics of food preferences: a first view from silk road populations. *J Food Sci.* 2012;77:S413–8.
21. Fellows P, Hilmi M. *Selling street and snack foods.* Rome: Food and Agriculture Organization of the United Nations; 2011.
22. Gelormini M, Damasceno A, Lopes SA, Maló S, Chongole C, Muholove P et al. Street food environment in Maputo (STOOD map): a cross-sectional study in Mozambique. *JMIR Res Protocols.* 2015;4:e98.
23. *Trans-Fatty acids in Portuguese food products.* Copenhagen: WHO Regional Office for Europe; 2016.
24. Vieira E, Soares ME, Ferreira IMPLVO, Pinho O. Validation of a fast sample preparation procedure for quantification of sodium in bread by flame photometry. *Food AnalMeth.* 2012;5:430–4.
25. *Guideline: sugars intake for adults and children.* Geneva: World Health Organization; 2015.
26. Trieu K, Neal B, Hawkes C, Dunford E, Campbell N, Rodriguez-Fernandez R et al. Salt reduction initiatives around the world – a systematic review of progress towards the global target. *PLoS One.* 2015;10:e0130247.
27. *Danish data on trans fatty acids in foods.* Glostrup: Ministry of Food, Agriculture and Fisheries; 2014.
28. Hawkes C, Thow A, Downs S, Ling A, Ghosh-Jerath S, Snowdon W et al. Identifying effective food systems solutions for nutrition and noncommunicable diseases: creating policy coherence in the fats supply chain. *SCN News.* 2013;40:39-47.
29. Downs SM, Thow AM, Ghosh-Jerath S, Leeder SR. Identifying the barriers and opportunities for enhanced coherence between agriculture and public health policies: improving the fat supply in India. *Ecol Food Nutr.* 2015;54:603–24.

Annex 1.

Example of industrial foods collected at street food vending sites in Bishkek

<p>Bun</p>		<p>Chocolate</p>	
<p>Chalap beverage made from fermented milk, salt and carbonated water</p>		<p>Biscuits</p>	
<p>Crisps</p>		<p>Corn snacks</p>	
<p>Croutons</p>			

Maksym

Carbonated
fermented
beverage
made
from grain,
usually malt



Pirozhnoe

Sweet
pastries

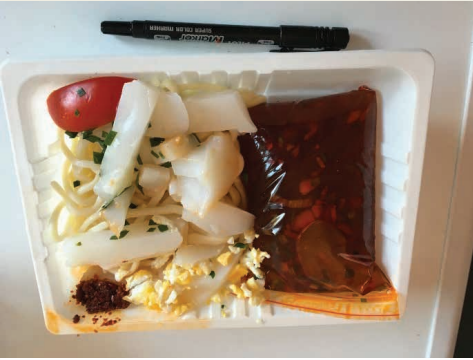








Chocolate-
filled wafers



Annex 2.

Example of homemade foods collected at street food vending sites in Bishkek

<p>Ashlyamfu</p> <p>Traditional noodle dish made of chopped vegetables and/or meat, served cold or warm</p>		<p>Pierogi</p> <p>Also called honey cake</p>	
<p>Belyashi</p> <p>Traditional small meat pie</p>		<p>Chebureki</p> <p>Traditional fried savoury snack generally filled with ground or minced meat and onions</p>	
<p>Lepyoshka</p> <p>Bread</p>		<p>Kompot</p> <p>Homemade beverage made by cooking fruit in a large volume of water, often with sugar or raisins</p>	
<p>Bun</p>			

Corn



Hamburger



Hot dog



Keksi

Muffin



Kurut

Salty snack made by straining and drying sour milk or yoghurt



Lagman

Traditional noodle dish made of chopped peppers and other vegetables served in a spicy, vinegary sauce



Manty

Boiled or steamed pasta-wrapped snack usually filled with ground spiced lamb or beef



Piroshok

Baked pie made from yeast dough, commonly stuffed with meat (typically beef) or vegetables



Porridge



Carrot salad



Sandwich



**Samsa
(sambusa or
samosa)**



**Minced
meat (lamb,
beef or
chicken)
and
vegetables
wrapped in
flaky pastry
or bread**

Sausage roll



The WHO Regional Office for Europe

The World Health Organization (WHO) is a specialized agency of the United Nations created in 1948 with the primary responsibility for international health matters and public health. The WHO Regional Office for Europe is one of six regional offices throughout the world, each with its own programme geared to the particular health conditions of the countries it serves.

Member States

Albania
Andorra
Armenia
Austria
Azerbaijan
Belarus
Belgium
Bosnia and Herzegovina
Bulgaria
Croatia
Cyprus
Czechia
Denmark
Estonia
Finland
France
Georgia
Germany
Greece
Hungary
Iceland
Ireland
Israel
Italy
Kazakhstan
Kyrgyzstan
Latvia
Lithuania
Luxembourg
Malta
Monaco
Montenegro
Netherlands
Norway
Poland
Portugal
Republic of Moldova
Romania
Russian Federation
San Marino
Serbia
Slovakia
Slovenia
Spain
Sweden
Switzerland
Tajikistan
The former Yugoslav
Republic of Macedonia
Turkey
Turkmenistan
Ukraine
United Kingdom
Uzbekistan

World Health Organization Regional Office for Europe
UN City, Marmorvej 51, DK-2100 Copenhagen Ø, Denmark
Tel.: +45 45 33 70 00 Fax: +45 45 33 70 01
Email: euwhocontact@who.int
Website: www.euro.who.int