NIJZ National Institute of Public Health

100 Years

A Century's Experience for a Healthy Future

ISO Fd Food ERA Chair Safety Quality Traceability

2nd ISO-FOOD Symposium
Portorož, Slovenia

April 24 – 26, 2023

ISO-FOOD FROM FOOD SOURCE TO HEALTH

National food consumption data (SI.Menu study) in dietary exposure and intake assessments

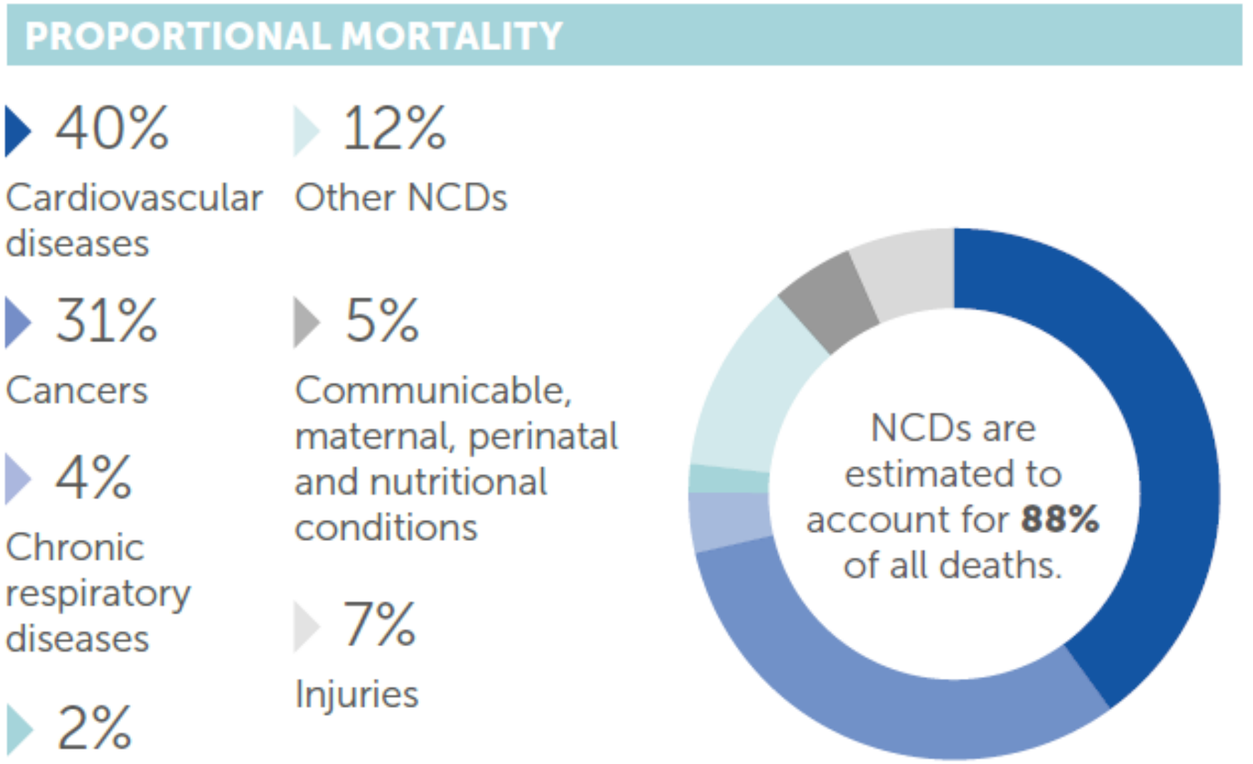
U.Blaznik, M.Gregorič, B. Koroušić Seljak, M.Hribar, Ž. Lavriša, H.Hristov, I.Pravst

Introduction

Non-communicable diseases (NCD) are the leading causes of death and disease burden in the world and in Slovenia.

Dietary risk factors and physical inactivity are considered as key risk factors for the development of NCD.

“Dober Tek Slovenija” – National Programme on Nutrition and Health Enhancing Physical Activity 2015 - 2025



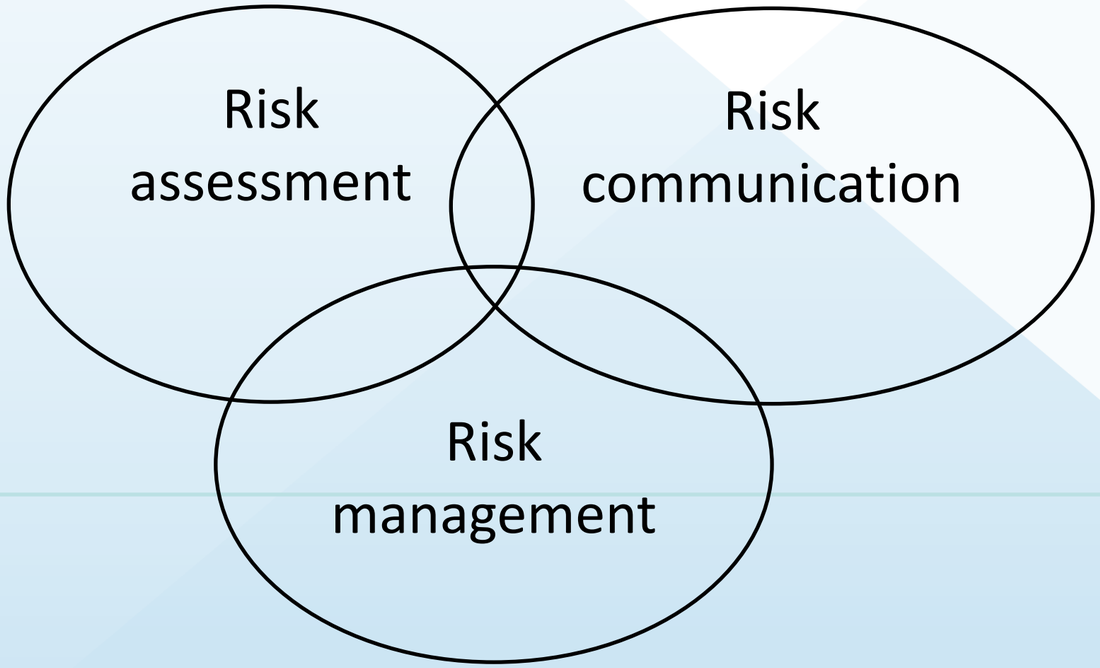
WHO, Slovenia 2018, country profile

https://www.dobertekslovenija.si/nacionalni-program-dober-tek-slovenija/

Introduction – Risk analysis

Regulation (EC) No 178/2002 laying down the general principles and requirements of food law, establishing the European Food Safety Authority and laying down procedures in matters of food safety

RISK ANALYSIS– a process consisting of three interconnected components



Introduction – Risk assesment

1. Hazard identification

2. Hazard characterization

3. Exposure assessment

4. Risk characterization

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Risk = hazard x exposure

Introduction – Risk assesment

1. Hazard identification

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Risk = hazard x exposure

Introduction – Exposure assesment

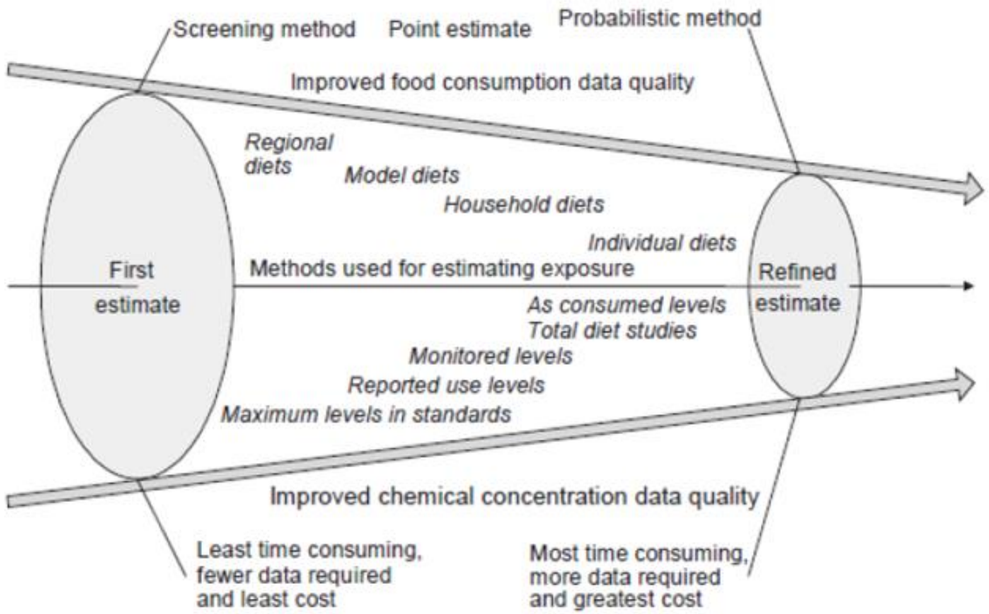
Exposure Assessment Tools

Tier 0 model diet

Tier 1 deterministic

Tier 2 refined

- probabilistic
- Usual intake



Introduction – Exposure assesment

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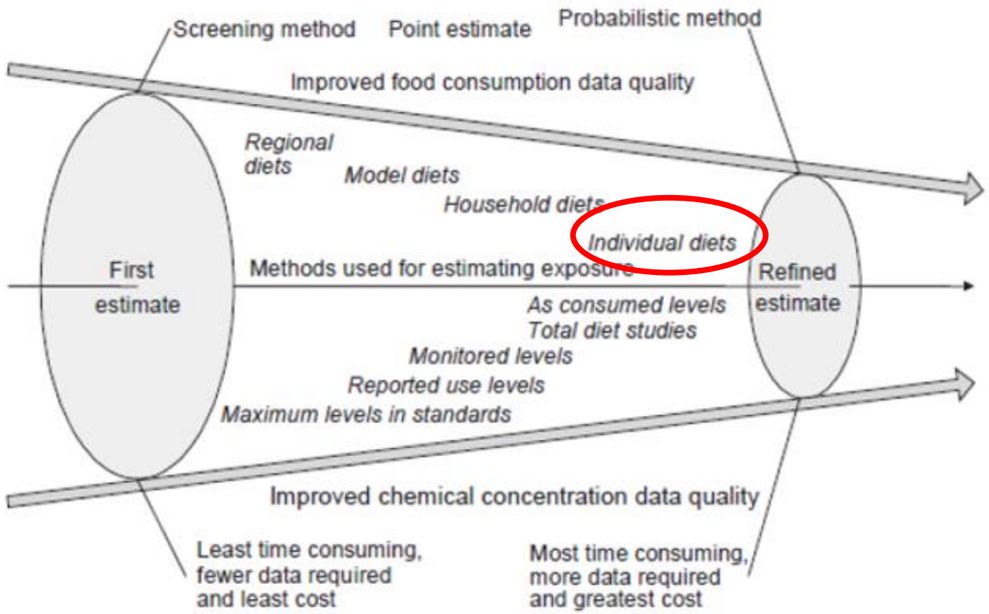

SI.Menu 2017/18

Prof.ddr. Marjan Simčič

2019

2017/18

2016

2015

2014

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univerzitetni klinični center ljubljana
University Medical Centre Ljubljana

NUTRITION INSTITUTE

Institut "Jožef Stefan" Ljubljana, Slovenija

University of Ljubljana Biotechnical Faculty

SI.Menu dietary study - methodology

EFSA Guidance on EU Menu methodology

Sample size

- 1006 infants (3 – 11 m) and toddlers (1-2y)
- 2280 adolescents (10 – 17y), adults (18 – 64y) and elderly (65 – 74y)

Survey samples were spread over 52 weeks

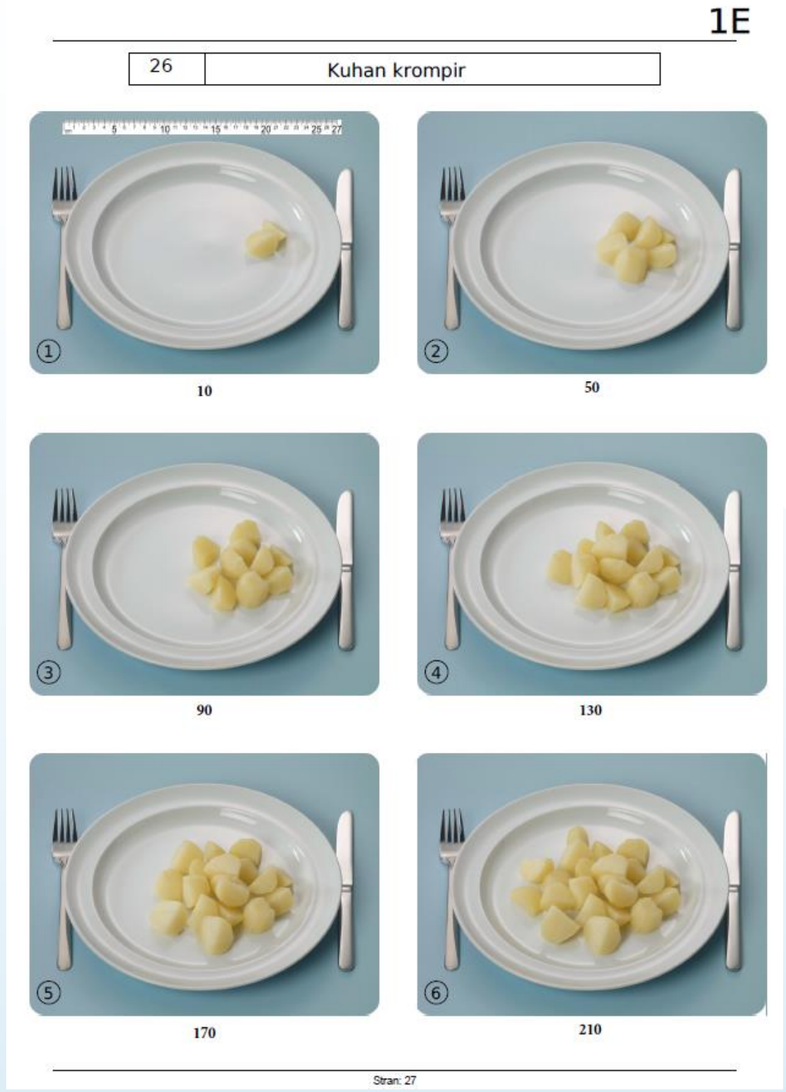
- Divided into quarters (3-monthly samples)
- Each quarter divided to: 5/7 of the sample interviewed during week days; 2/7 of the sample interviewed during weekends

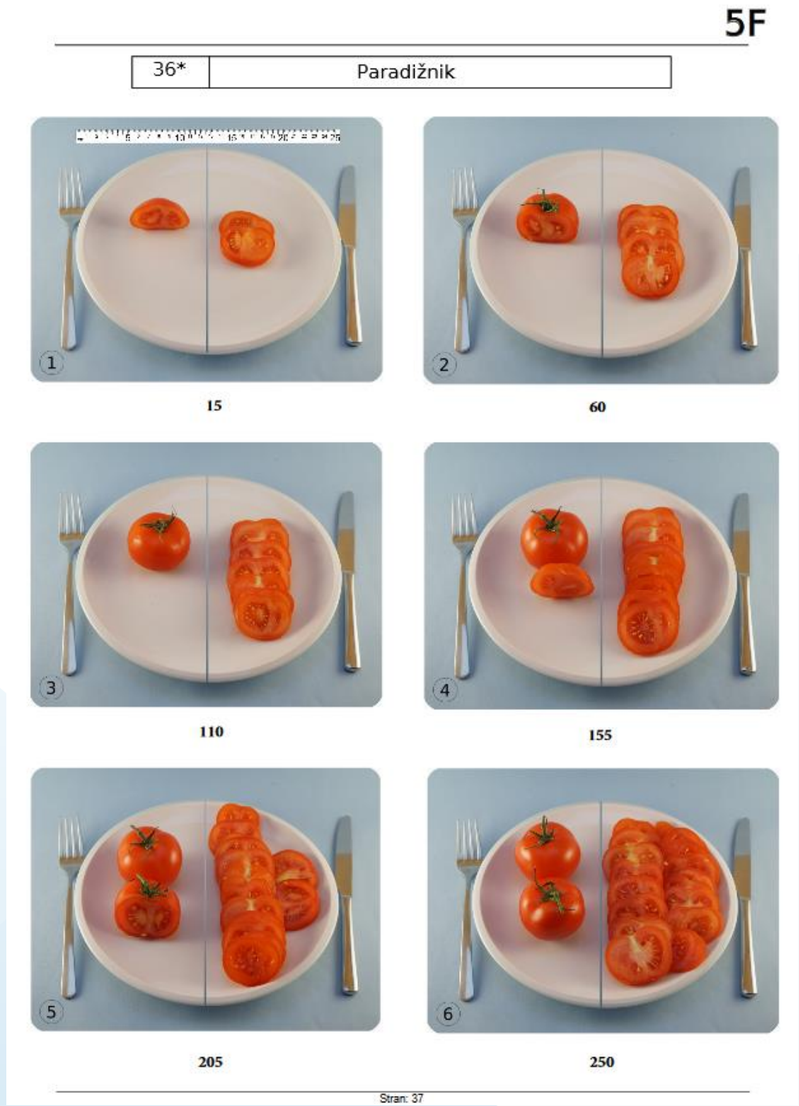
2006 subjects completed the study, the average response rate was 65 %.

	Infants	Toddlers	Adolescents	Adults	Older adults	All
N	302	359	495	393	457	2006
Response	67.9 %	71.7 %	68.6 %	56.7 %	64.9 %	65.4 %

SI.Menu dietary study – data collection

- Two computer-assisted personal interviews (CAPI)
- Two 24h-recalls combined with Food Propensity Questionnaire (FPQ) of 75 food items
- General questionnaire (socio-demographic, socio-economic status, health status, lifestyle factors)
- International Physical Activity Questionnaire (IPAQ score)
- Anthropometric measurements (body mass, body height/length)





Picture book, Vede T, NIJZ, 2017

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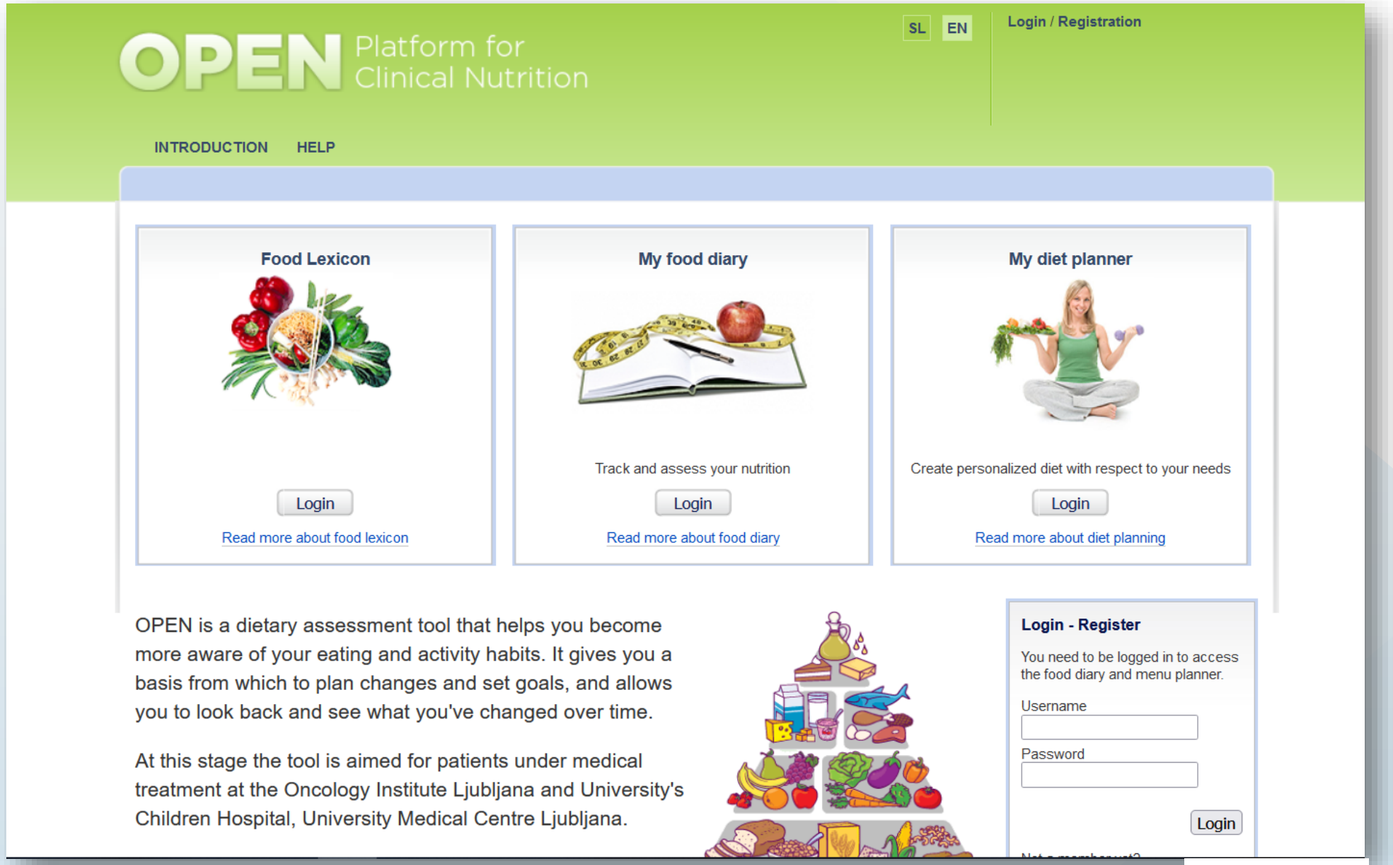
SI.Menu dietary study – OPEN Software



- Upgraded to support 24h-recall
- Food composition database (energy and nutrients)
- Recipe-calculation procedure (EuroFIR)
- FoodEx2 food classification

http://opkp.si/

Jožef Stefan Institute

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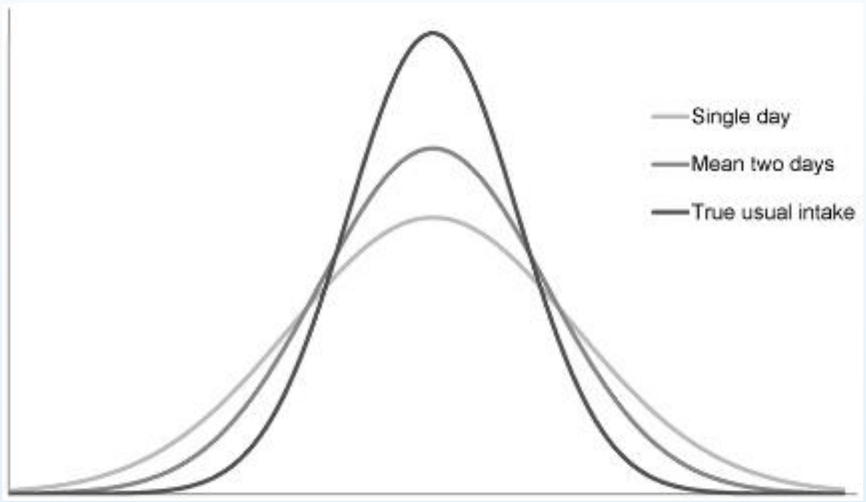
SI.Menu dietary study – Data Analysis

- Usual daily intake of foods and nutrients – two 24-h recalls and FPQ
- The intake distributions



- Multiple Source Method (MSM) *Haubrock J et al., 2011*
- Descriptive analysis

SI.Menu dietary study - Results

ountry DESC	Start Year ID	Dietary methods DESC	Survey DESC	Survey CODE	Survey Reference publication	Survey Replicates	Survey Interview meetings	Survey Response rate (%)	Survey Min age range (years)	Sur ran
lovenia	2007	24-hours dietary recall	CRP-2008	CRP 2008	Gabrijelčič Blenkuš M, Gregorič M, Tivadar B, Koch V, Kostanjevec S, Turk Fajdiga V, Zalar A, Lavtar D, Kuhar D and Rozman U, 2009. Prehrambene navade odraslih prebivalcev Slovenije z vidika varovanja zdravja. Pedagoška fakulteta, Inštitut za varovanje zdravja RS. Ljubljana.	1		52	18	65
lovenia	2017	Food record, 24-hours dietary recall	Slovenian national food consumption survey	SI.MENU-2018	EFSA supporting publication 2019:EN-1728, 2019:EN-1729	2	2	67.3% adults/62.2% children	0,25	74

https://www.efsa.europa.eu/en/microstrategy/food-consumption-survey

https://nijz.si/publikacije/razlicni-vidiki-prehranjevanja-prebivalcev-slovenije/

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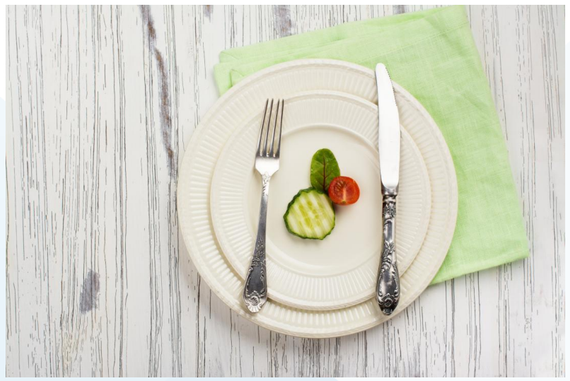
SI.Menu dietary study – Results

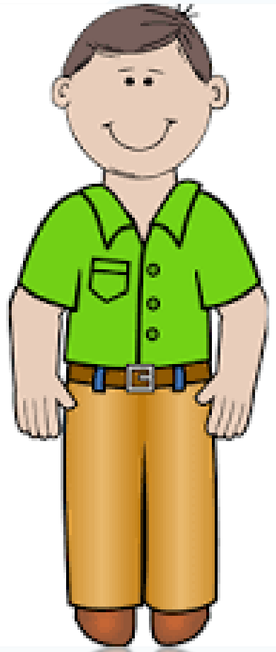
- Diet of the Slovenian population differ from dietary guidelines

Meat and meat products

HSFS food
UPF



Fruit and vegetables



- Men
- Adult
- Lower SES

nutrients

MDPI

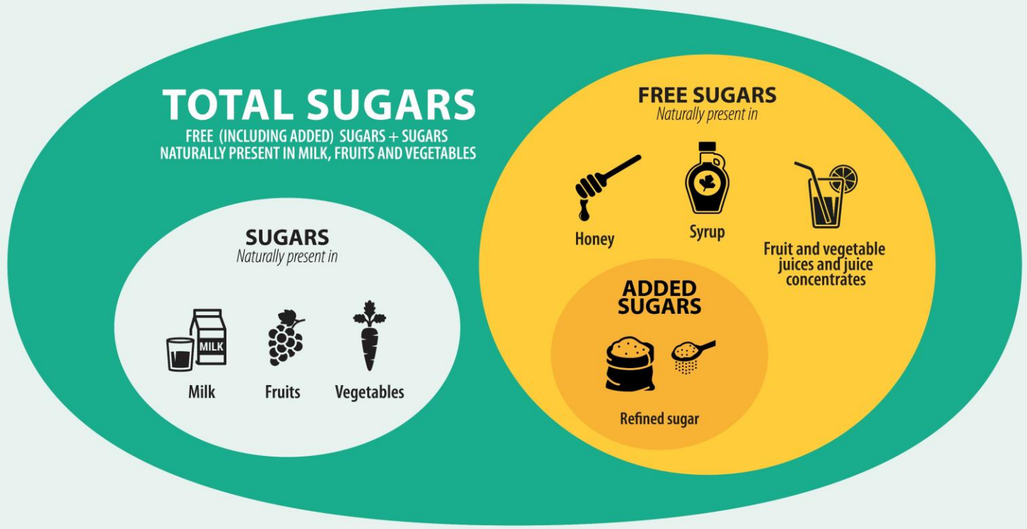
Article

Dietary Intakes of Slovenian Adults and Elderly: Design and Results of the National Dietary Study SI.Menu 2017/18

Matej Gregorič [1,*], Hristo Hristov [2], Urška Blaznik [1], Barbara Koroušić Seljak [3], Nataša Delfar [4] and Igor Pravst [2,5,6]

Total and Free Sugars

- Added and free sugars are linked to obesity, liver disease, type 2 diabetes, higher levels of cholesterol, hypertension.
- World Health Organization (WHO) recommends limiting free sugars intake to no more than 10% of total energy intake.
- The scientific evidence SUPPORTS RECOMMENDATIONS in Europe to limit the intake of added and free sugars (EFSA, 2022).



Dietary intake (SI.Menu): The median free sugars intake accounted for 10.1% of total energy intake (TEI) among adolescents, 6.4%
among adults, and 6.5% in the elderly population.

Zupanič N et al. Dietary Intake of *trans* Fatty Acids in the Slovenian Population. Nutrients. 2021 Jan 12;13(1):207.

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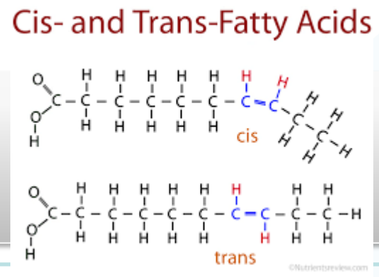
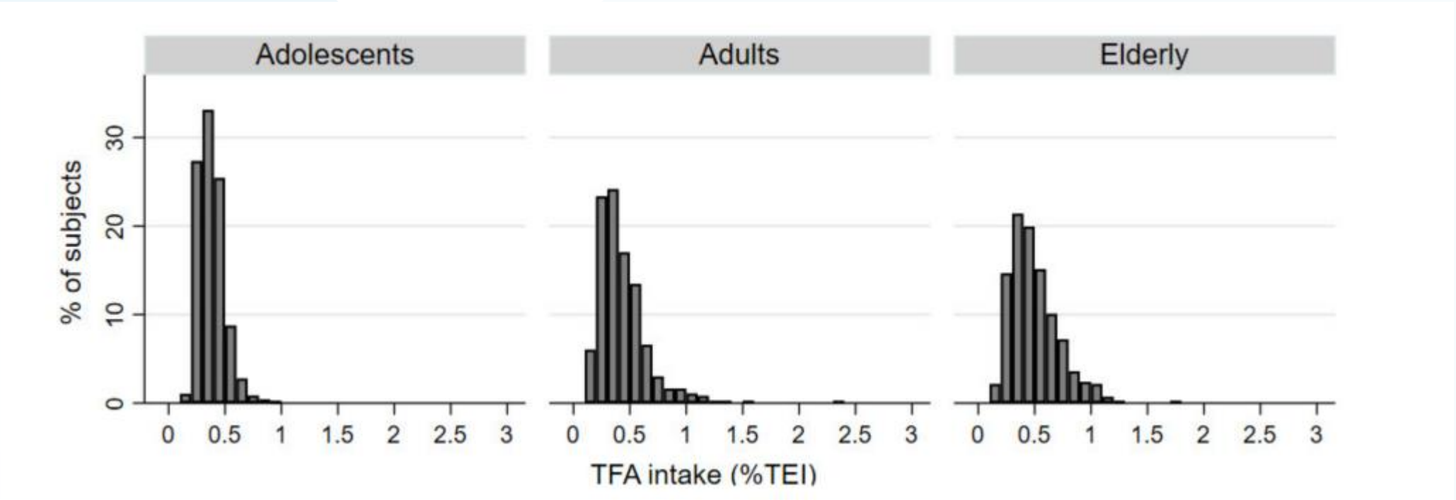
trans Fatty acids



- Consumption of *trans* fatty acids (TFAs) has been linked to several adverse health effects, with the increased risk of cardiovascular disease as one of the most well understood.
- In 2018, Slovenia introduced a ban on iTFAs on top of preceding voluntary calls to industry to reduce its use of partially hydrogenated oils (PHOs) as the main source of iTFAs.

Dietary intake (SI.Menu): 13% of adolescents, 29.4% of adults, and 41.8% of the elderly population still consumed more than 0.50% TEI with TFAs.



Zupanič N et al. Dietary Intake of *trans* Fatty Acids in the Slovenian Population. Nutrients. 2021 Jan 12;13(1):207.

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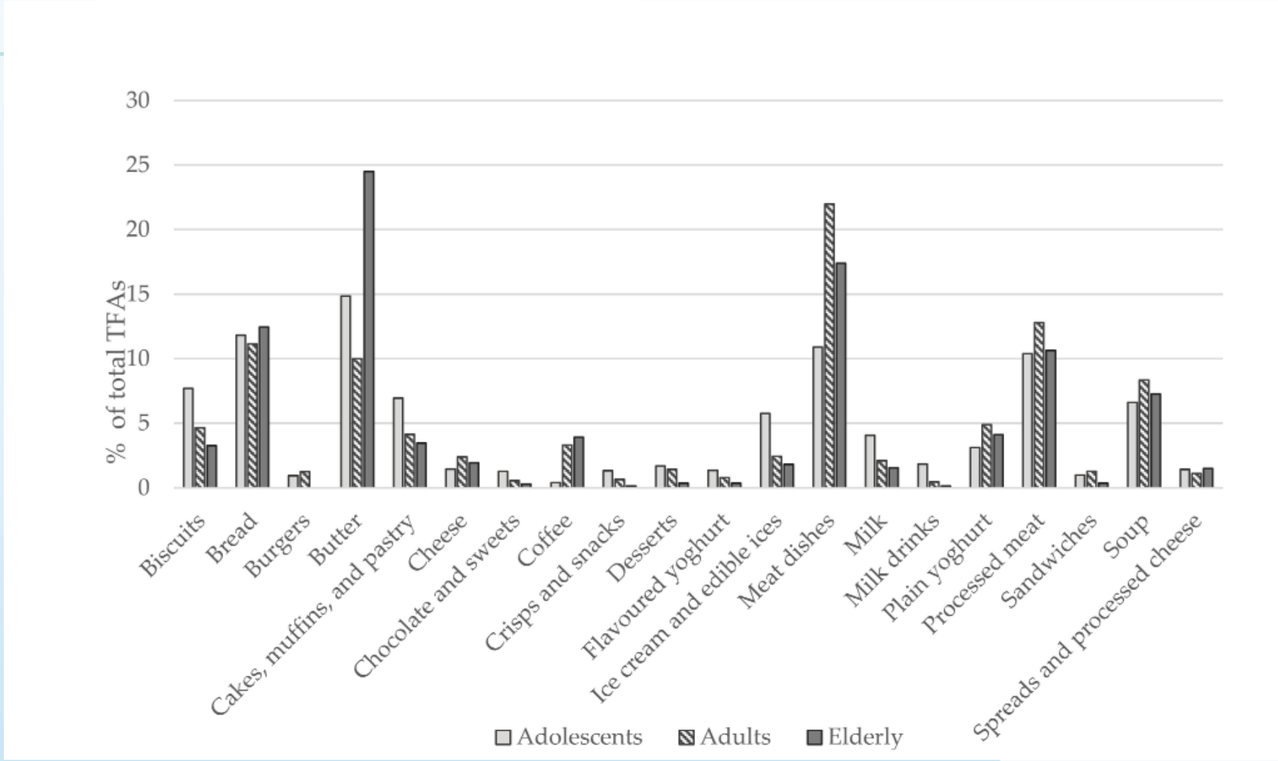
trans Fatty acids

- The main sources of TFAs in the diet were naturally present TFAs from butter, meat and meat products, regardless of the age group.
- Results indicate that following the reformulation activities, the major sources of TFAs in the diets of the Slovenian population now represent foods which are natural sources of TFAs.

Zupanič N et al. Dietary Intake of *trans* Fatty Acids in the Slovenian Population. Nutrients. 2021 Jan 12;13(1):207.



Dietary Fibre

Dietary fibre has proven to promote healthy body mass and reduce the risk of NCD.

Recommendation > 30g/day

The proportion of the population with inadequate intake: 90.6 % of adolescents, 89.6 % in adults, 83.9 % in older adults.

Challenges in food composition data !

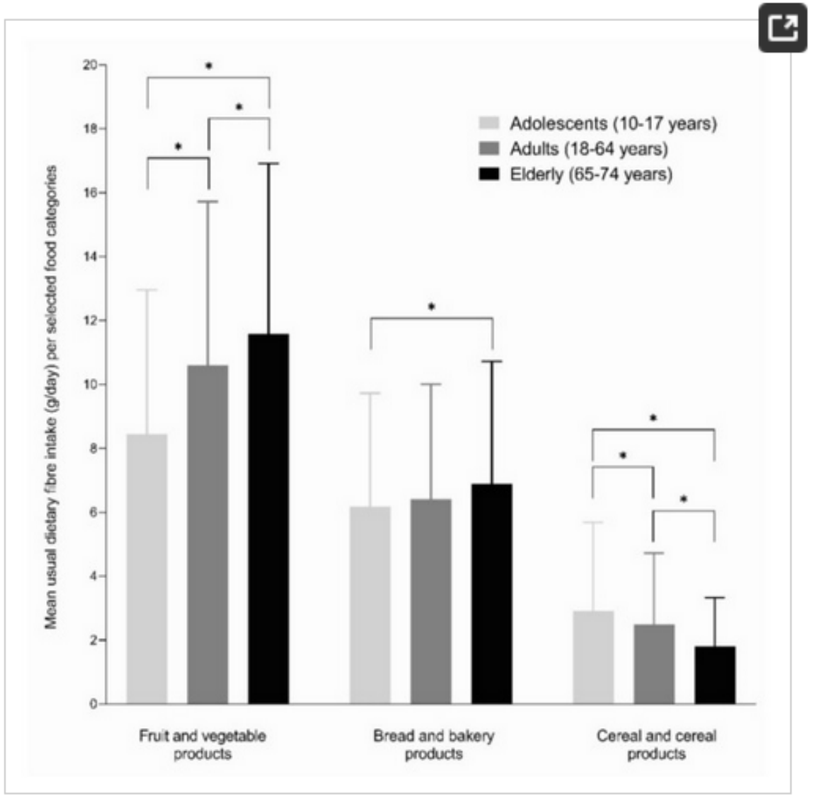


Figure 1. Mean usual dietary fibre intakes (g/day) from selected food categories among different age groups. The symbol * denotes a trend in the difference.

Seljak, B.K. et al. Inadequate Intake of Dietary Fibre in Adolescents, Adults, and Elderlies: Results of Slovenian Representative SI. Menu Study. Nutrients 2021, 13, 3826.

Micronutrients intake

Vitamin D

Vitamin B12

Folate

Iron

Iodine…

Serum biomarkers

NUTRIHEALTH study

“MANJSOLI.SI” study

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Micronutrients intake – Vitamin D

The estimated mean daily vitamin D intake was 2.7, 2.9 and 2.5 µg in adolescents, adults and older adults.

Reference intake value: 5 (20) µg/day

The study results explained the previously reported high prevalence of vitamin D deficiency in Slovenia.

Hribar M et al. Vitamin D Intake in Slovenian Adolescents, Adults, and the Elderly Population. *Nutrients* **2021**, *13*, 3528.

Micronutrients intake – Vitamin B12

The estimated mean daily vitamin B12 intakes were 6.2 µg (adults), 5.4 µg (adolescents) and 5.0 µg (older adults).

Reference intake value: 4 µg/day (adults)

Lower intakes observed for females.
The highest deficiency prevalence was found in older adults (7.0 %), males.

Lavriša Ž et al. Dietary Intake and Status of Vitamin B12 in Slovenian Population. Nutrients. 2022 Jan 13;14(2):334.

Micronutrients intake – Folate

Very low folate intake (< 300 µg/day) was observed in 59 % of adolescents, 58 % of adults and 68 % of older adults.

Reference intake value: 400 µg/day

Major dietary contributors were vegetables and fruit, and cereal products.

Pravst I et al. Dietary Intake of Folate and Assessment of the Folate Deficiency Prevalence in Slovenia Using Serum Biomarkers. Nutrients. 2021, 13, 3860.

Micronutrients intake – Sodium, Potassium, Iodine

- Probabilistic dietary exposure model based on SI.Menu and HBM data
- Monte Carlo Risk Assessment Tool. https://mcra.rivm.nl/

MANJ SOLI.SI

SODIUM, POTASSIUM, AND IODINE INTAKE DETERMINED FROM 24-HOUR URINARY EXCRETION: RESULTS FROM A PILOT STUDY

SAŠA KUGLER[1], MARUŠA REHBERGER[1], ALEŠ KOROŠEC[1], NINA BOŽIČ JEŠE[2], MATEJ SOMRAK[2], ADRIJANA OBLAK[2], MAŠA HRIBAR[3], METKA ZALETEL[1], SIMONA GABRŠČEK[3], JANA BRGULJAN HITIJ[1], KATJA ZALETEL[1], ANITA KUŠAR[2], IGOR PRAVST[3], IVAN ERŽEN[1], URŠKA BLAZNIK[1]

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INTRODUCTION

High intake of sodium, together with low intake of potassium, are two of the leading risk factors that contribute to the risk of developing hypertension. Data on sodium (salt) intake in Slovenian population hasn't been updated since 2012 and data on potassium intake has been lacking. Since salt is also a major source of iodine, activities to reduce salt intake have put adequacy of iodine intake under question.

METHODS

The pilot study was conducted between March and April 2022. A total of 500 participants aged between 25 and 64 were invited to join. Data on participant's health, nutrition and socio-demographic characteristics were gathered through a questionnaire and physical measurements. Sodium and potassium intake was calculated from 24-hour urinary sodium and potassium concentrations. Urinary iodine concentration (UIC) was determined by modified spectrophotometric method as described by Oblak et al [1].

RESULTS

The final sample included 120 participants (56 men and 64 women). Mean urinary sodium and potassium excretion was 165 mmol/day (95% CI: 149-180) and 64,2 mmol/day (95% CI: 59,9-68,4), respectively. This translates to estimated intake of 10,1 g salt/day (95% CI: 9,17-11,1) and 3,25 g potassium/day (95% CI: 3,04-3,47).

Median UIC was 95,9 mcg/L (IQR=73,0) and median urinary iodine excretion was 188 mcg/day (IQR=89,6).

Figure 1: Average intake of salt and potassium determined from 24-hour urinary excretions.

Figure 2: Distribution of urinary iodine concentration (UIC) determined in 24-h urine samples (n=119).

CONCLUSIONS

The results of this pilot study indicate a need for further actions to lower salt and increase potassium intakes in Slovenian adult population. According to criteria set by WHO, 52,5% of pilot study participants had insufficient iodine status.

REFERENCES

[1] Oblak A, Arshenko P, Erlund I, Kuzmanovska S, Zaletel K, Ceberščak S. Validation of a spectrophotometric method for urinary iodine determination on microplate based on Sandell-Kolthoff Reaction. Lab Med. 2022;53(4):376-380.

FUNDING

The Manjsoli.si survey was supported by Ministry of Health of the Republic of Slovenia, and Slovenian Research Agency (CRP-V5-2109). The survey was also conducted within research program P3-0395 'Nutrition and Public Health'. We acknowledge that S.K. has been supported by postgraduate research funding from Slovenian Research Agency.

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Chemical mixtures and dietary exposure

Populations are exposed to mixtures of chemicals through their diet on a daily basis.

The question of which substances should be assessed together remains a major challenge.

The EuroMix project has developed a strategy for mixture risk assessment. It has proposed a methodology that combines exposures and hazard information to identify relevant mixtures of chemicals belonging to any cumulative assessment group (CAG) to which the European population is exposed.

EuroMix

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Chemical mixtures and dietary exposure

Sprong C, Crépet A, Metruccio F, Blaznik U, Anagnostopoulos C, Christodoulou DL, et al. Cumulative dietary risk assessment overarching different regulatory silos using a margin of exposure approach: A case study with three chemical silos. Food and Chemical Toxicology. 2020;142:111416.
doi: 10.1016/j.fct.2020.111416

Crépet A, Vanacker M, Sprong C, de Boer W, Blaznik U, Kennedy M, et al. Selecting mixtures on the basis of dietary exposure and hazard data: application to pesticide exposure in the European population in relation to steatosis. Int J Hyg Environ Health. 2019;222(2):291–306.
doi: 0.1016/j.ijheh.2018.12.002

EuroMix

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Acknowledgments

- Slovenian Research Agency (National Research Programme P3-0395 “Nutrition and Public Health”, P2-0098, IO-0054, L3-7538, L7-1849, L3-8213)
- European Food Safety Authority (EFSA) No.OC/EFSA/DATA/2014/02-LOT2-CT03
- Ministry of Health
- Horizon 2020, EuroMix project (No.633172)

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Thank you for your attention!

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