



# **ODRŽIVA ISHRANA I ZDRAVLJE**

**PROF. DR BUDIMKA NOVAKOVIĆ  
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UNIVERZITET NOVI SAD**

PRE 200 GODINA – 1 000 000 000  
NAKON 123 GODINE – 2 000 000 000  
NAKON 46 GODINA - 4 000 000 000  
SAMO 12 GODINA KASNIJE + 1 000 000 000

2011. GODINA – 7 000 000 000

2050. GODINA – 10 000 000 000



## Article 25.

(1) Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, **including food**, clothing, housing and medical care and necessary social services, and the right to security in the event of unemployment, sickness, disability, widowhood, old age or other lack of livelihood in circumstances beyond his control.

FOOD SECURITY  
FOOD SAFETY

1. Mosher WS. The magnitude of global population growth. In: Eggersdorfer M, Kraemer K, Cordaro BJ, Jess F, Gibney M, Kennedy E, Labrique A, Steffen J, editors. Good nutrition: perspectives for the 21st century. Basel; New York: Karger, 2016. p 32-42.
2. Universal Declaration of Human Rights. [Internet]. [cited 2021 Sep 29]. Available from: [www.un.org/en/universal-declaration-human-rights/](http://www.un.org/en/universal-declaration-human-rights/)



UNITED NATIONS DECADE OF  
**ACTION ON NUTRITION**  
2016-2025

Nearly 805 million people remain chronically undernourished and 159 million children under 5 years of age are stunted.

Approximately 50 million children under 5 years of age are overweight. Two billion people suffer from micronutrient deficiencies. 2.1 billion people are affected by overweight and 600 million are obese. The prevalence of overweight and obesity is increasing in nearly all countries.

**> 3 000 000 000 (> 40%) LJUDI  
NEMA DOSTUPNU PRAVILNU  
(ZDRAVU) ISHRANU**

**MOŽE DA NAHRANI**

**1/3 GODIŠNJE PROIZVEDENE HRANE**

- FOOD LOSS (14%)
- FOOD WASTE (17%)

**MASOVNE NEZARAZNE BOLESTI  
NUTRITIVNE TRANZICIJE  
URBAN LIFE (2014.: 55% → 2050.:68%)  
↑TROŠKOVA 1,3 X 10<sup>12</sup> \$  
GODIŠNJE DO 2030. GODINE**

1. United Nations Decade of Action on Nutrition (2016-2025). [Internet]. [cited Sep 30 2021]. Available from: [www.un.org/en/ga/search/view\\_doc.asp?symbol=A/70/L.42](http://www.un.org/en/ga/search/view_doc.asp?symbol=A/70/L.42)
2. Global, regional, and national comparative risk assessment of 79 behavioural, environmental and occupational, and metabolic risks or clusters of risks in 188 countries, 1990–2013: a systematic analysis for the Global Burden of Disease Study 2013. Lancet. 2015. [Internet]. 2013 [cited 2021 Sept 30]. Available from: [www.thelancet.com](http://www.thelancet.com)
3. Food and Agriculture Organization of the United Nations. The future of food is in our hands. 2021 [Internet]. cited 2021 Sept 30). Available from: [www.fao.org/world-food-day/about/en/](http://www.fao.org/world-food-day/about/en/)

# ISHRANA MORBOGENI ČINILAC MORTALITETNI ČINILAC

## 2017. GODINA ISHRANA UZROK

- 255 000 000 DALYs\*
- 11 000 000 SMRTI

2050. GODINA – 10 000 000 000 LJUDI  
PROIZVODNJA HRANE 2005/2007. →2050. ↑70%

ISHRANA TREBA DA ZADOVOLJI:

- ENERGETSKE POTREBE
- POTREBE U NUTRIJENTIMA

\*DALYs-DISABILTY –ADJUSTED LIFE YEARS



## GLOBALNO VODEĆE VODEĆE GRUPE RIZIKA 2013. GODINA

RIZICI	MORTALITET (U HILJADAMA)	PROMENA* (MED. %)	DALYs (U HILJADAMA)	PROMENA (MED %)
BIHEVIJORALNI	18 453	18,7	717 608	- 10,2
<b>IZ ISHRANE</b>	11 274	39,6	241 351	35,9
METABOLIČKI	15 723	46,5	373 827	48,9
<b>VISOK KRVNI PRITISAK</b>	10 364	49,1	208 129	45,1

\* PROMENA 1990 – 2013. GODINA

Global, regional, and national comparative risk assessment of 79 behavioural, environmental and occupational, and metabolic risks or clusters of risks in 188 countries, 1990–2013: a systematic analysis for the Global Burden of Disease Study 2013. Lancet. 2015. [Internet]. 2013 [cited 2015 Sept 24]. Available from: [www.thelancet.com](http://www.thelancet.com) Published online September 11, 2015 [http://dx.doi.org/10.1016/S0140-6736\(15\)00128-2](http://dx.doi.org/10.1016/S0140-6736(15)00128-2)

## RIZICI IZ ISHRANE

## TMREL\*

<b>NEDOVOLJAN UNOS VOĆA</b>	<b>200 – 400 g/DAN</b>
<b>NEDOVOLJAN UNOS POVRĆA</b>	<b>350 – 450 g/DAN</b>
<b>NEDOVOLJAN UNOS NAMIRNICA OD CELOG ZRNA</b>	<b>100 – 150 g/DAN</b>
<b>NEDOVOLJAN UNOS JEZGRASTOG VOĆA I SEMENKI</b>	<b>12 – 20 g/DAN</b>
<b>NEDOVOLJAN UNOS MLEKA</b>	<b>425 – 475 g/DAN</b>
<b>VISOK UNOS MESA</b>	<b>11,4 – 17,1 g/DAN</b>
<b>VISOK UNOS MESNIH PRERAĐEVINA</b>	<b>0 – 14,3 g/DAN</b>
<b>VISOK UNOS ZASLAĐENIH BEZALKOHOLNIH NAPITAKA</b>	<b>0 – 64,3 g/DAN</b>
<b>NEDOVOLJAN UNOS DIJETNIH VLAKANA</b>	<b>28 – 32 g/DAN</b>
<b>SUBOPTIMALNI UNOS KALCIJUMA</b>	<b>0 - 77 g/DAN</b>
<b>NEDOVOLJAN UNOS <math>\omega</math> - 3 MASNIH KISELINA</b>	<b>200 – 300 mg/DAN</b>
<b>NEDOVOLJAN UNOS POLINEZASIĆENIH MASNIH KISELINA</b>	<b>10 – 15% DEU</b>
<b>VISOK UNOS TRANS MASNIH KISELINA</b>	<b>0 - 0,8% DEU</b>
<b>VISOK UNOS SOLI</b>	<b>1 - 5 g/DAN</b>

\*TMREL – TEORETSKI MINIMUM IZLOŽENOSTI

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graph TD; A[EU GREEN DEAL: FARM TO FORK STRATEGY] --> B[TREBA DA PRATE PROMENE U NAČINU ISHRANE  
33 000 000 LJUDI NEMA NUTRITIVNO ODGOVARAJUĆI OBROK  
SVAKOG 2. DANA]; B --> C[20% ZDRAVSTEVNO BEZBEDNE HRANE → FOOD WASTE]; C --> D[> 50% ODRASLIH GRAĐANA EU IMA PREKOMERNU TELESNU  
MASU (PTM)  
NE PRATE SE NUTRITIVNE PREPORUKE  
OBEZOGENA ŽIVOTNA SREDINA]; D --> E[PRAĆENJE NUTRITIVNIH PREPORUKA  
↓ UTICAJ PREHRAMBENOG SISTEMA NA "ENVIROMENTAL  
FOOTPRINT"];
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**EU GREEN DEAL: FARM TO FORK STRATEGY**

**TREBA DA PRATE PROMENE U NAČINU ISHRANE**  
**33 000 000 LJUDI NEMA NUTRITIVNO ODGOVARAJUĆI OBROK**  
**SVAKOG 2. DANA**

**20% ZDRAVSTEVNO BEZBEDNE HRANE → FOOD WASTE**

**> 50% ODRASLIH GRAĐANA EU IMA PREKOMERNU TELESNU**  
**MASU (PTM)**  
**NE PRATE SE NUTRITIVNE PREPORUKE**  
**OBEZOGENA ŽIVOTNA SREDINA**

**PRAĆENJE NUTRITIVNIH PREPORUKA**  
**↓ UTICAJ PREHRAMBENOG SISTEMA NA "ENVIROMENTAL**  
**FOOTPRINT"**

## AKTUELNO PONAŠANJE U POTROŠNJI HRANE

2013. GODINA



21. VEK, VODEĆI IZAZOV:  
PREHRAMBENI  
ZDRAVSTVENI  
EKOLOŠKI  
POLITIČKI

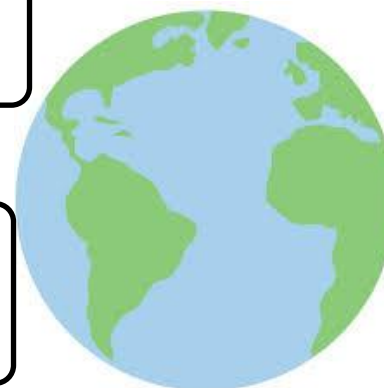
KAKO OSIGURATI NUTRITIVNO GUSTU  
ISHRANU

2050. GODINA



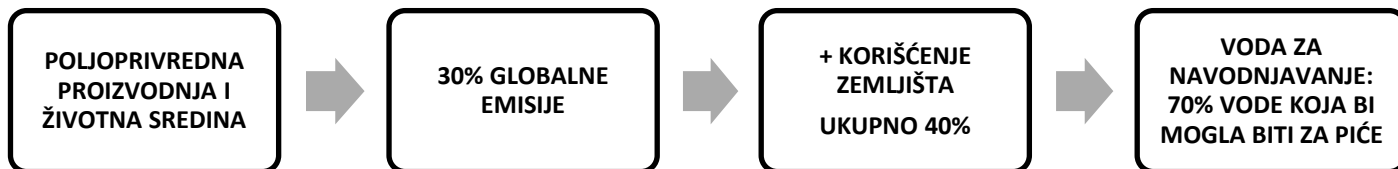
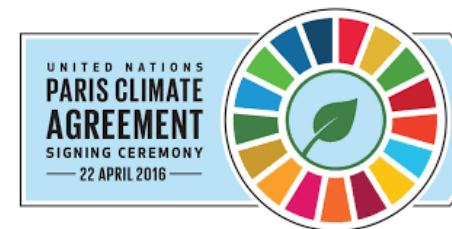
ZA NARASTAJUĆU POPULACIJU

OČUVANJE I ↑ ŽIVOTNE SREDINE



1. Food and Agriculture Organization of the United Nations. The state of food and agriculture. Rome, Italy: Food and Agriculture Organization of the United Nations; 2013.
2. Willett W, Rockström J, Loken B, Springmann M, Lang T, Vermeulen S, Garnett T, Tilman D, DeClerck F, Wood A, Jonell M, Clark M, Gordon LJ, Fanzo J, Hawkes C, Zurayk R, Rivera JA, De Vries W, Majele Sibanda L, Afshin A, Chaudhary A, Herrero M, Agustina R, Branca F, Lartey A, Fan S, Crona B, Fox E, Bignet V, Troell M, Lindahl T, Singh S, Cornell SE, Srinath Reddy K, Narain S, Nishtar S, Murray CJL. Food in the anthropocene: the EAT-Lancet Commission on healthy diets from sustainable food ems. Lancet. 2019;2:393(10170):447-92.

21. VEK  
 ISHRANA VISOKE  
 ENERGETSKE GUSTINE  
 ↑ PRERAĐENE  
 NAMIRNICE



1. Monteiro CA, Cannon G, Moubarac JC, Levy RB, Louzada MLC, Jaime PC. The UN Decade of Nutrition, the NOVA food classification and the trouble with ultra-processing. *Public Health Nutr.* 2018;21(1):5-17.
2. Food and Agriculture Organization of the United Nations. The state of food and agriculture. Climate change, agriculture and food security. Rome (Italy): Food and Agriculture Organization of the United Nations; 2016.
3. Food and Agriculture Organization of the UN. The state of world fisheries and aquaculture 2016. Contributing to food security and nutrition for all. Rome (Italy): Food and Agriculture Organization of the UN; 2016.
4. United Nations. Transforming our world: the 2030 agenda for sustainable development. [Internet]. Cited 2021 Sep 30. Available from: [sdgs.un.org/2030agenda](https://sdgs.un.org/2030agenda)
5. The Paris Agreement. [Internet]. Cited 2021 Sep 30. Available from: [www.unfccc.int/files/essential\\_background/convention/application/pdf/english\\_paris\\_agreement.pdf](https://www.unfccc.int/files/essential_background/convention/application/pdf/english_paris_agreement.pdf)

**ISHRANA U KOJOJ SE SUSREĆU NUTRITIVNE POTREBE, ZDRAVSTVENO BEZBEDNA, NUTRITIVNO POŽELJNA I RAZNOVRSNA HRANA KOJA OMOGUĆAVA AKTIVAN ŽIVOT I SMANJUJE RIZIK ZA NASTANAK BOLESTI**

**HRANA KOJA OMOGUĆAVA UNOS VITAMINA, MINERALA I OSTALIH HRANLJIVIH MATERIJA I DOPRINOSI POŽELJNOM NUTRITIVNOM UNOSU I/ILI IMA POZITIVNE ZDRAVSTVENE EFEKTE, BEZ ILI SA MALO ČVRSTIH MASTI I DODATIH ŠEĆERA, RAFINISANIH ŽITARICA I SOLI**

**POVRĆE, VOĆE, NAMIRNICE OD CELOG ZRNA, MORSKI PLODOVI, JAJA, MAHUNARKE, NISKOMASNI MLEČNI PROIZVODI, MRŠAVA MESA I PROIZVODI OD MESA KOJI SU PROIZVEDENI SA MALO ILI BEZ DODATIH ČVRSTIH MASTI, ŠEĆERA, SKROBA I SOLI.**

1. Practice Paper of the Academy of Nutrition and Dietetics. Selecting nutrient-dense foods for good health. *J Acad Nutr Diet.* 2016;116:1473-79.
2. U.S. Department of Agriculture and U.S. Department of Health and Human Services. Dietary guidelines for americans, 2020-2025. 9th Edition.
3. Drewnowski A, Finley J, Hess JM, Ingram J, Miller G, Peters C. Toward healthy diets from sustainable food systems. *Curr Dev Nutr.* 2020;20;4(6):nzaa083.
4. Academy of Nutrition and Dietetics. Practice paper. Nutrient density—meeting nutrient goals within calorie needs. *J Acad Nutr Diet.* 2007;107(5):860-9.

- **ODRŽIVA ISHRANA JE ISHRANA KOJA IMA NIZAK UTICAJ NA ŽIVOTNU SREDINU**
- **ZDRAVA JE ZA SADAŠNJE I BUDUĆE GENERACIJE**
- **ODRŽIVA ISHRANA ŠTITI I POŠTUJE BIODIVERZITET I EKOSISTEM**
- **KULTUROLŠKI JE PRIHVATLJIVA I PRISTUPAČNA, EKONOMSKI POŠTENA I DOSTUPNA**
- **NUTRITIVNO JE JE ADEKVATNA, ZDRAVSTVENO JE BEZBEDNA**
- **OPTIMALNA JE ZA PRIRODNE I LJUDSKE RESURSE.**

# ENERGIJA

## ENERGETSKA RAVNOTEŽA

**MUŠKARAC 30 GODINA**

**TM =70 kg**

**UMERENA DO ↑ FIZIČKA  
AKTIVNOST**

**DEP = 2500 kcal**

**ŽENA 30 GODINA TM=60 kg,**

**UMERENA DO ↑ FIZIČKA  
AKTIVNOST**

**DEP= 2100 kcal**

**GLOBALNO PROSEČAN BMI 22**

**SAGLASAN SA DOBRIM  
ZDRAVLJEM**

Willett W, Rockström J, Loken B, Springmann M, Lang T, Vermeulen S, Garnett T, Tilman D, DeClerck F, Wood A, Jonell M, Clark M, Gordon LJ, Fanzo J, Hawkes C, Zurayk R, Rivera JA, De Vries W, Majele Sibanda L, Afshin A, Chaudhary A, Herrero M, Agustina R, Branca F, Lartey A, Fan S, Crona B, Fox E, Bignet V, Troell M, Lindahl T, Singh S, Cornell SE, Srinath Reddy K, Narain S, Nishtar S, Murray CJL. Food in the anthropocene: the EAT-Lancet Commission on healthy diets from sustainable food ems. Lancet. 2019;2:393(10170):447-92.

**FLEKSETERIJANSKA ISHRANA**

**SEMI-VEGETERIJANSKA ISHRANA**

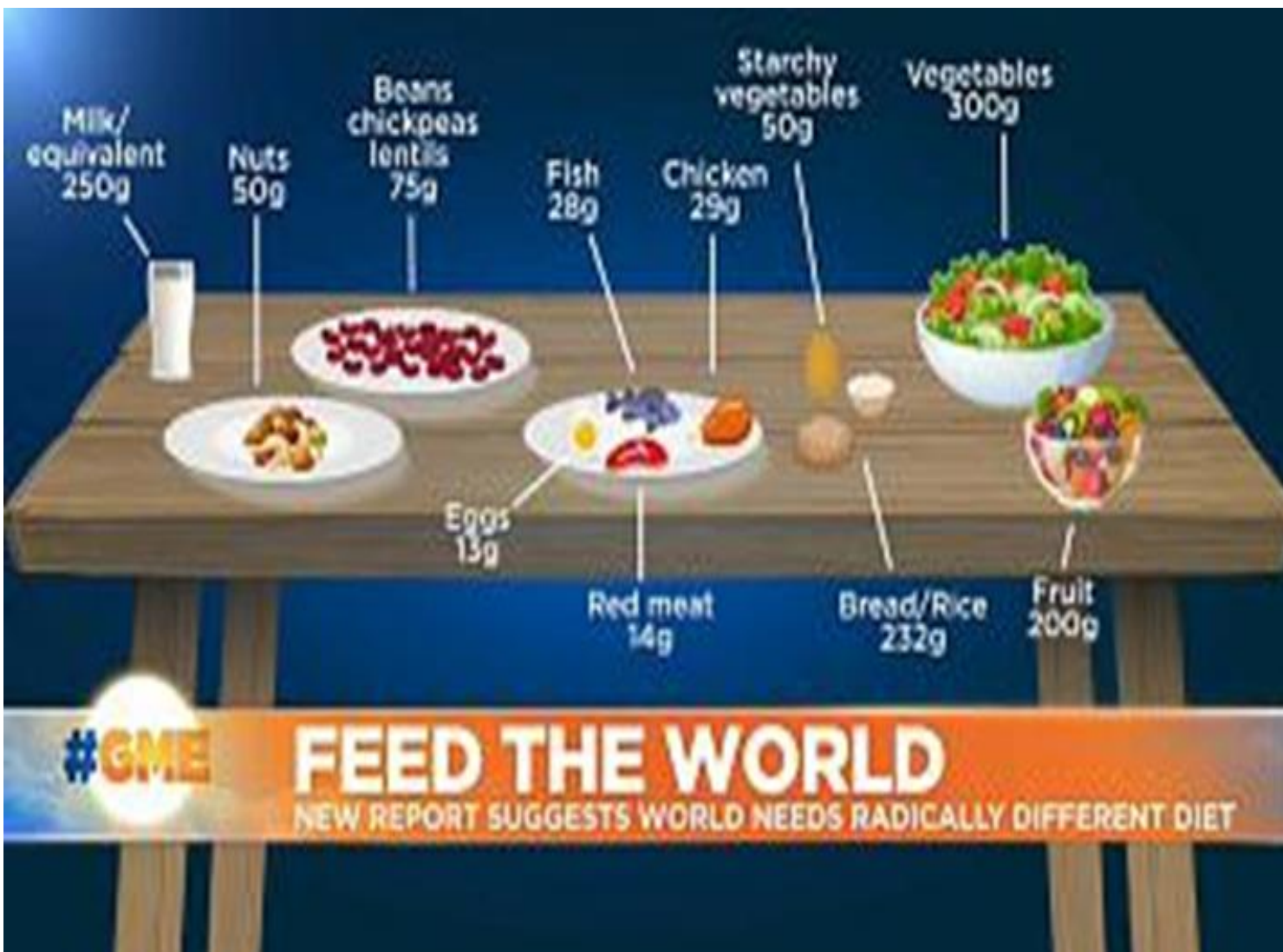
- ZASNIVA SE NA BILJNOJ HRANI SA POVREMENIM KONZUMIRANJEM MESA/RIBE
- ↓STRIKTNA OD VEGETERIJANSKE ISHRANE

**FLEXETERIJANSKA ISHRANA**

**IZVEDEN NAZIV: FLEXIBILE I VEGETERIJANSKI**

1. Woolstone C. Healthy people, healthy planet: the search for a sustainable global diet. *Nature*. 2020;588:S54-S
2. Derbyshire EJ. Flexitarian diets and health: a review of the evidence-based literature. *Front Nutr*. 2017;3:55.
3. Willett W, ET AL. Lindahl T, Singh S, Cornell SE, Srinath Reddy K, Narain S, Nishtar S, Murray CJL. Food in the Anthropocene: the EAT-Lancet Commission on healthy diets from sustainable food ems. *Lancet*. 2019;393:447-92.

# EAT- LANCET COMMISSION ON HEALTHY DIETS FROM SUSTAINABLE FOODS



1. Willett W, ET AL. Lindahl T, Singh S, Cornell SE, Srinath Reddy K, Narain S, Nishtar S, Murray CJL. Food in the Anthropocene: the EAT-Lancet Commission on healthy diets from sustainable food ems. Lancet. 2019;393:447-92.
2. Woolstone C. Healthy people, healthy planet: the search for a sustainable global diet. Nature. 2020;588:S54-S6.
3. Slika preuzeta sa: [www.euronews.com/2019/01/17/what-should-you-eat-to-stay-healthy-and-save-the-planet-euronews-answers](http://www.euronews.com/2019/01/17/what-should-you-eat-to-stay-healthy-and-save-the-planet-euronews-answers)

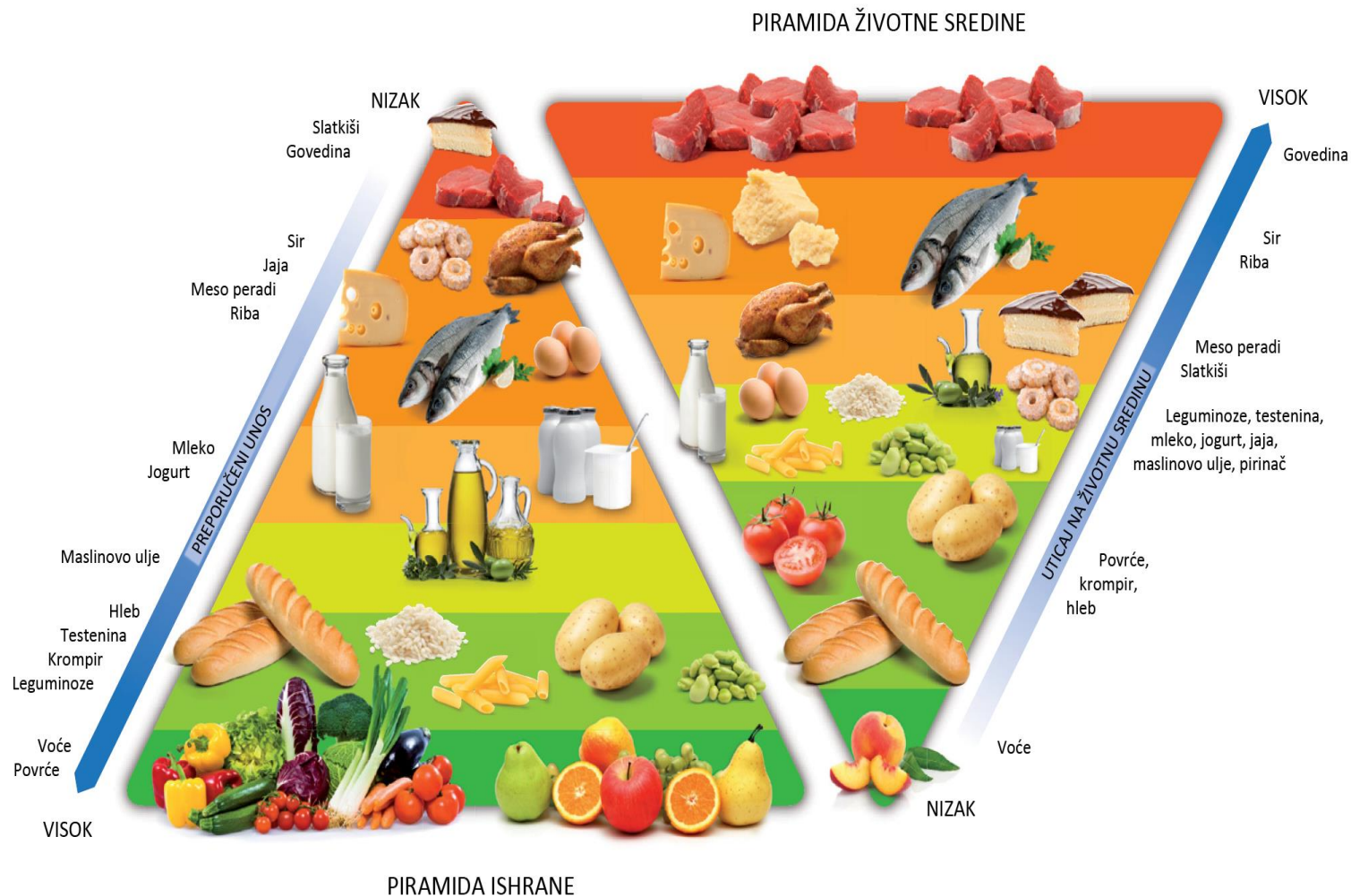
# ALI... ČVRSTI DOKAZI

- KONZUMIRANJE HRANE ŽIVOTINJSKOG POREKLA DOPRINELO JE POVEĆANJU MOŽDANE MASE U HUMANOJ VRSTI
- MEAT SUPPLEMENTATION IMPROVES GROWTH, COGNITIVE, AND BIHEVIORAL OUTCOMES IN KENYAN CHILDREN



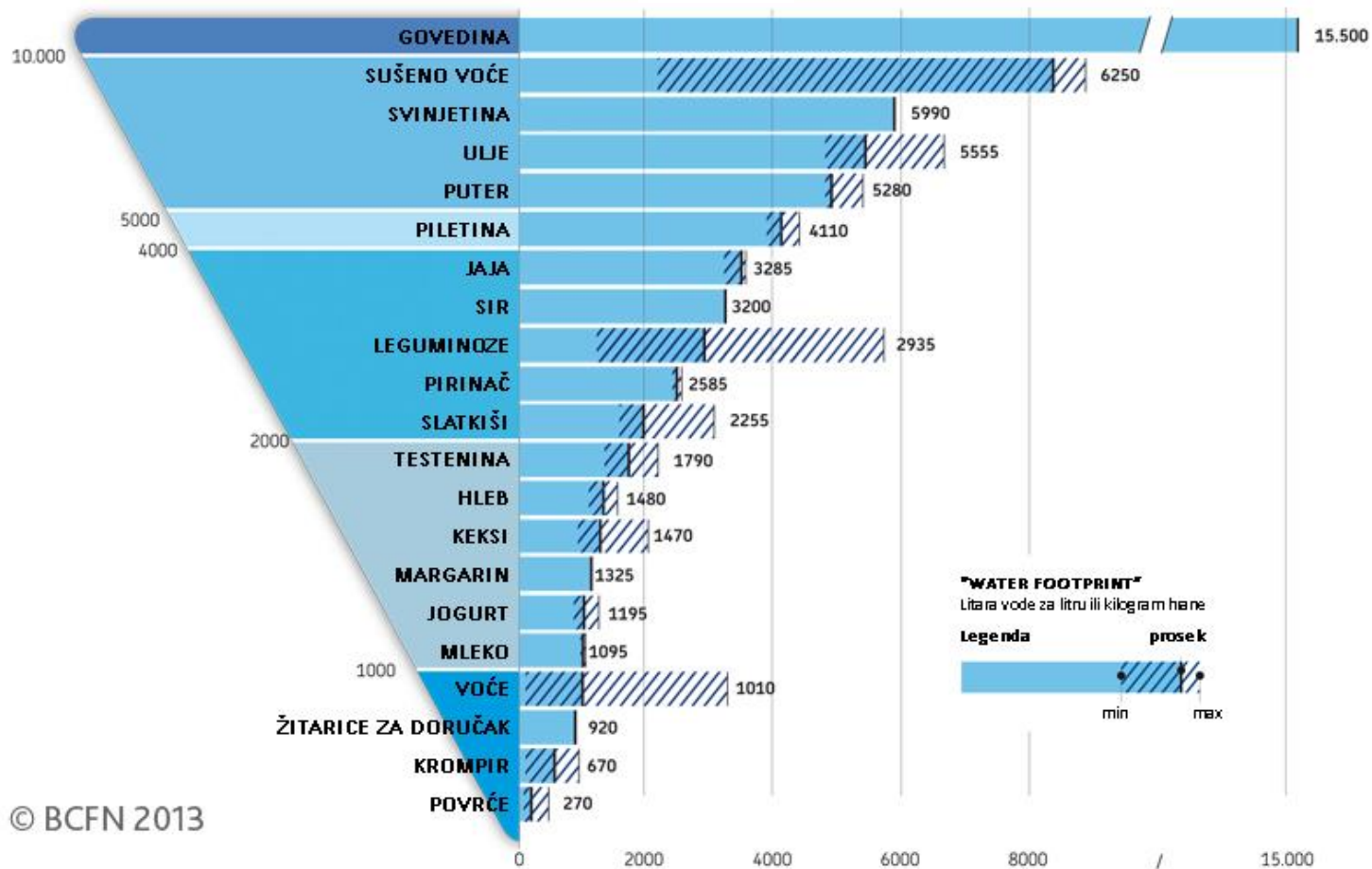
OKTOBR  
INTERNETIONAL AGENCY FOR RESEARCH ON CANCER (IARC)  
WORLD HEALTH ORGANIZATION (WHO)  
CARCINOGENICITY OF CONSUMPTION OF RED AND PROCESSED MEAT

1. Lerou F, Cofnas F. Should dietary guidelines recommend low red meat intake? *Crit Rev Food Sci Nutr.*2020;60(16):2763-272,
2. Gupta S. Clever eating. *Nature.* 2016;531:S1-S2.
3. Neumann C, Murphy S, Gewa C, Grillenberger M, Bwibo N. Meat supplementation improves growth, cognitive, and behavioral outcomes in Kenyan children. *J of Nutr.* 2014;137:1119-23.
4. Bouvard V, Loomis D, Guyton KZ, Grosse Y, El Ghissassi F, Benbrahim –Tallaa L, Guha N, Mattock H, on behalf of International Agency for Research on Cancer. Monograph Research Group. Carcinogenicity of red an processed meat. *Lancet.* 2015;16:1599-600.
5. Gonzalez Fisher C, Garnett T. Plates, pyramids and planets. *Developments in national healthy and sustainable dietary guidelines: a state of play assessment.* Rome (Italy)Food and Agriculture Organization of the United Nations, The Food Climate Research Network at the University of Oxford 2016.



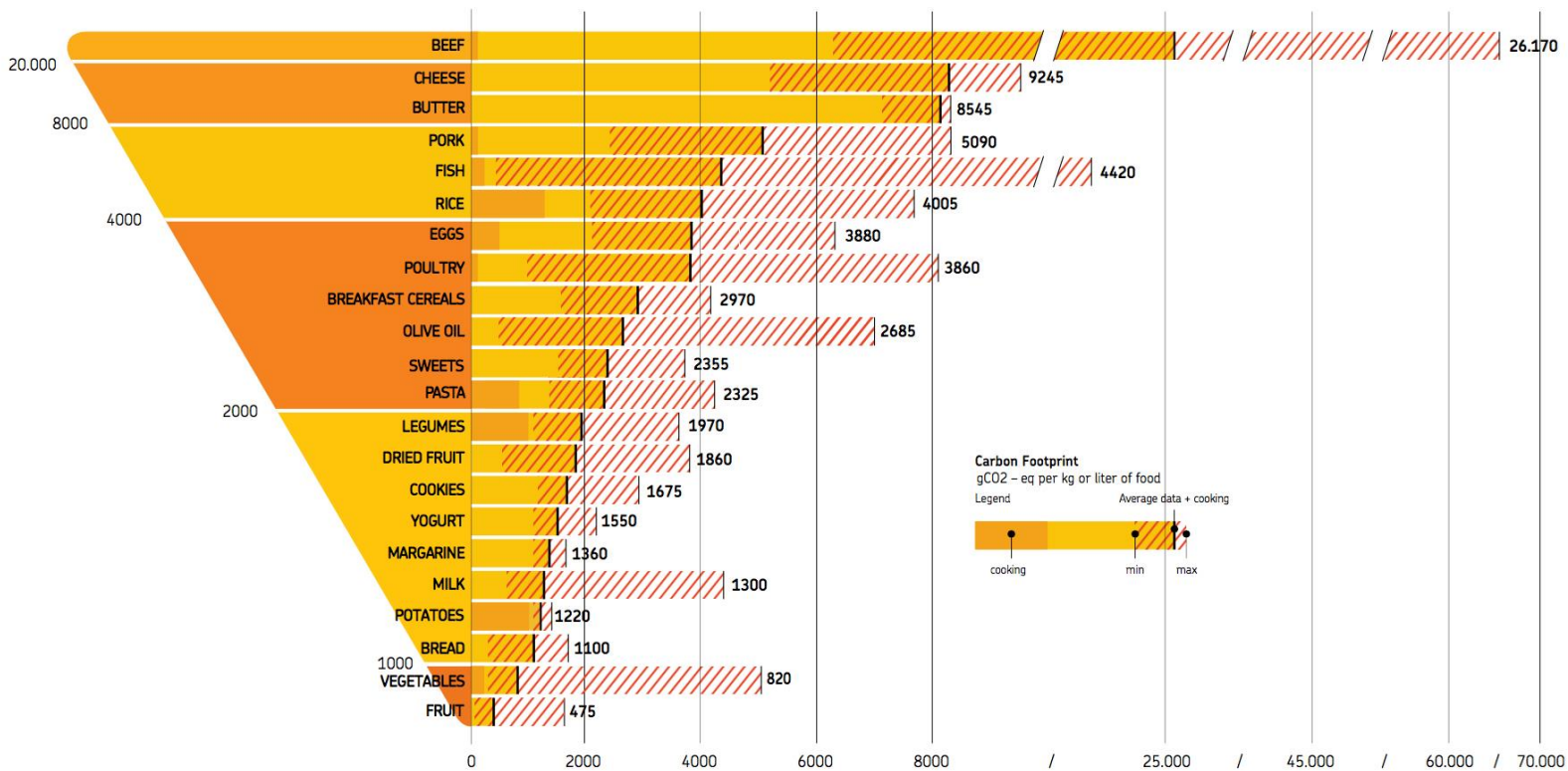
1. Barilla Center for Food & Nutrition. Double pyramid 2015. Recommendations for a sustainable diet. [Internet]. [cited 2021 Oct 01]. Available from: [www.barillacfn.com/m/publications/dp-2015-en.pdf](http://www.barillacfn.com/m/publications/dp-2015-en.pdf)
2. Barilla Center for Food & Nutrition. Good for you good for planet. [Internet]. [cited 2021 Oct 01]. Available from: [www.goodforyougoodfortheplanet.org/cross-issues/double-pyramid](http://www.goodforyougoodfortheplanet.org/cross-issues/double-pyramid)

# INFORMISANOST POTROŠAČA WATER FOOTPRINT

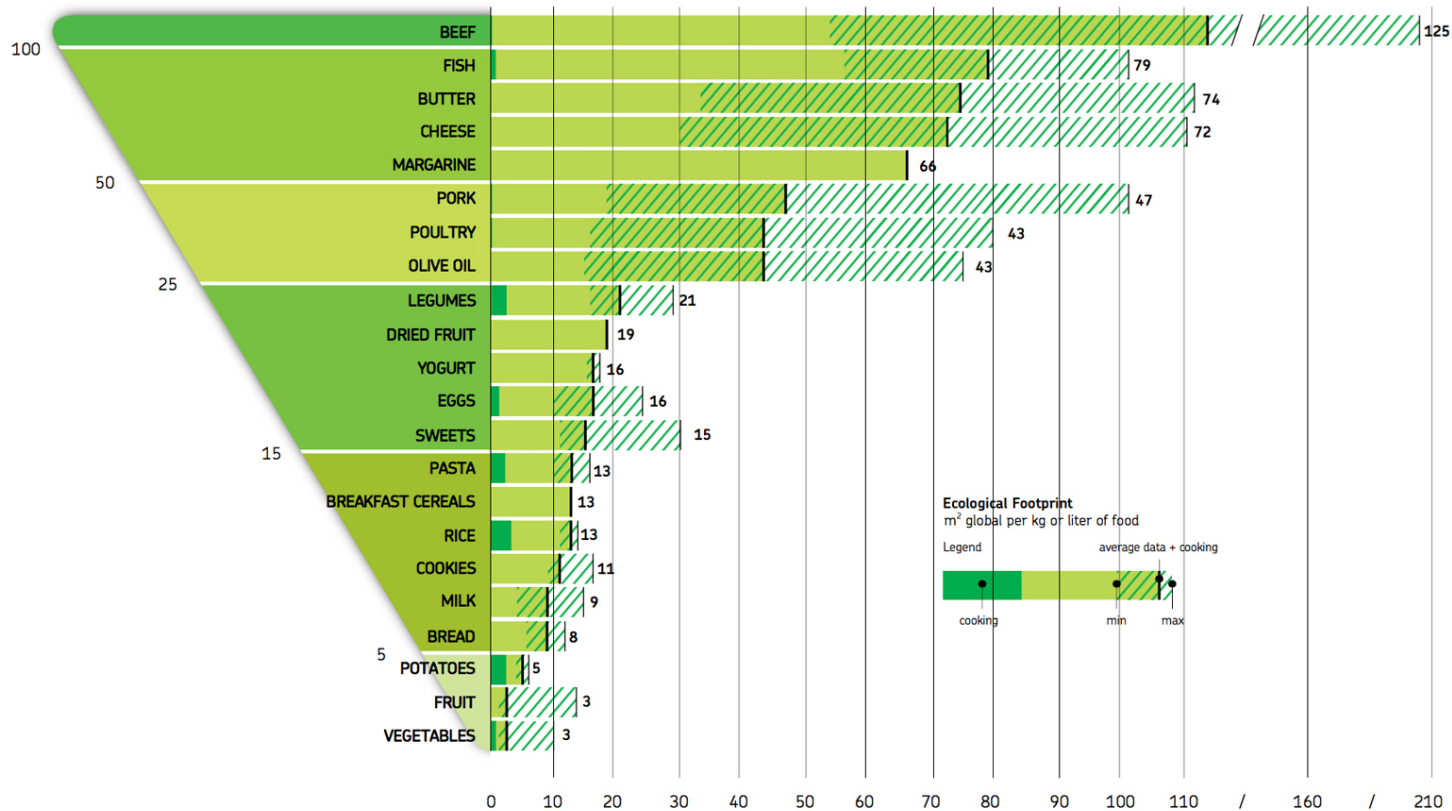
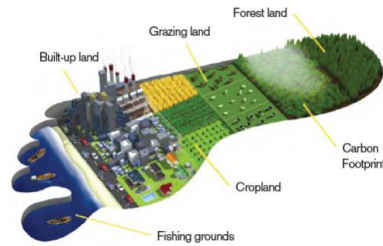


© BCFN 2013

# INFORMISANOST POTROŠAČA CARBON FOOTPRINT



# INFORMISANOST POTROŠAČA ECOLOGICAL FOOTPRINT



## GLOBALNA EKOLOŠKA CENA 100 g NAMIRNICE/m<sup>2</sup>

**VOĆE – 3 m<sup>2</sup>**

**POVRĆE**

○ SIROVO – 9 m<sup>2</sup>

○ BARENO -14 m<sup>2</sup>

**HLEB - 6,7m<sup>2</sup>**

**MASLINOVO ULJE HLADNO CEĐENO - 14,6 m<sup>2</sup>**

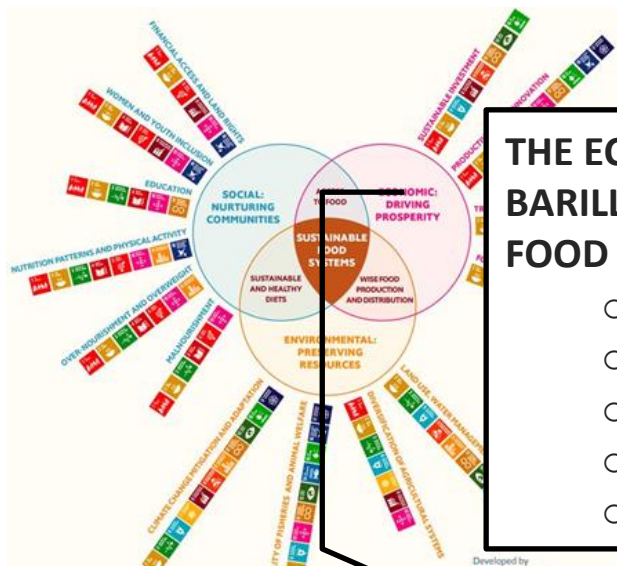
**SIR - 75m<sup>2</sup>**

**MESO CRVENO**

○ SIROVO – 95 m<sup>2</sup>

○ GRILOVANO – 105 m<sup>2</sup>





## THE ECONOMIST INTELLIGENCE UNIT BARILLA CENTER FOR FOOD AND NUTRITION FOOD SUSTAINABILITY INDEX (FSI)

- FOOD LOSS, FOOD WASTE
- ODRŽIVA POLJOPRIVREDA
- NUTRITIVNI IZAZOVI
- 38 INDIKATORA
- 95 SUB INDIKATORA

### KORELIRA SA

- HUMAN DEVELOPMENT INDEX
- SDGs

PREUZETO SA: [www.pinterest.co.kr/pin/183451384809632366/](https://www.pinterest.co.kr/pin/183451384809632366/)

78 ZEMALJA → 92% STANOVNIŠTVA

1. Food sustainability index. .[Internet]. [cited 2021 Oct 02]. Available from: [www.foodsustainability.eiu.com](http://www.foodsustainability.eiu.com)
2. Food sustainability index. 2017. [Internet]. [cited 2021 Oct 02]. Available from: [www.barillacfn.com/m/pdf/FoodSustainabilityIndex2017GlobalExecutiveSummary.pdf](http://www.barillacfn.com/m/pdf/FoodSustainabilityIndex2017GlobalExecutiveSummary.pdf)
3. Food and Agricultural Organization of UN. Food Sustainability index. [Internet]. [cited 2021 Oct 02]. [aims.fao.org/news/fsi-index-food-and-sustainability](https://aims.fao.org/news/fsi-index-food-and-sustainability)



**DRŽAVA**

## ETIKA POTROŠAČA

- ↓ FOOD WASTE
- ↓ UNOSA VISOKO PRERAĐENE HRANE
- ↓ ENERGETSKI GUSTE HRANE

## PRAVILNA ISHRANA

↑UNOS:

- SIROVOG VOĆA
- SIROVOG POVRĆA
- NAMIRNICA OD CELOG ZRNA
- MAHUNARKI
- KISELO-MLEČNIH PROIZVODA
- ODGOVARJUĆE KOLIČINE MRŠAVOG MESA



## 5 SAVETA ZA ODRŽIVU ISHRANU

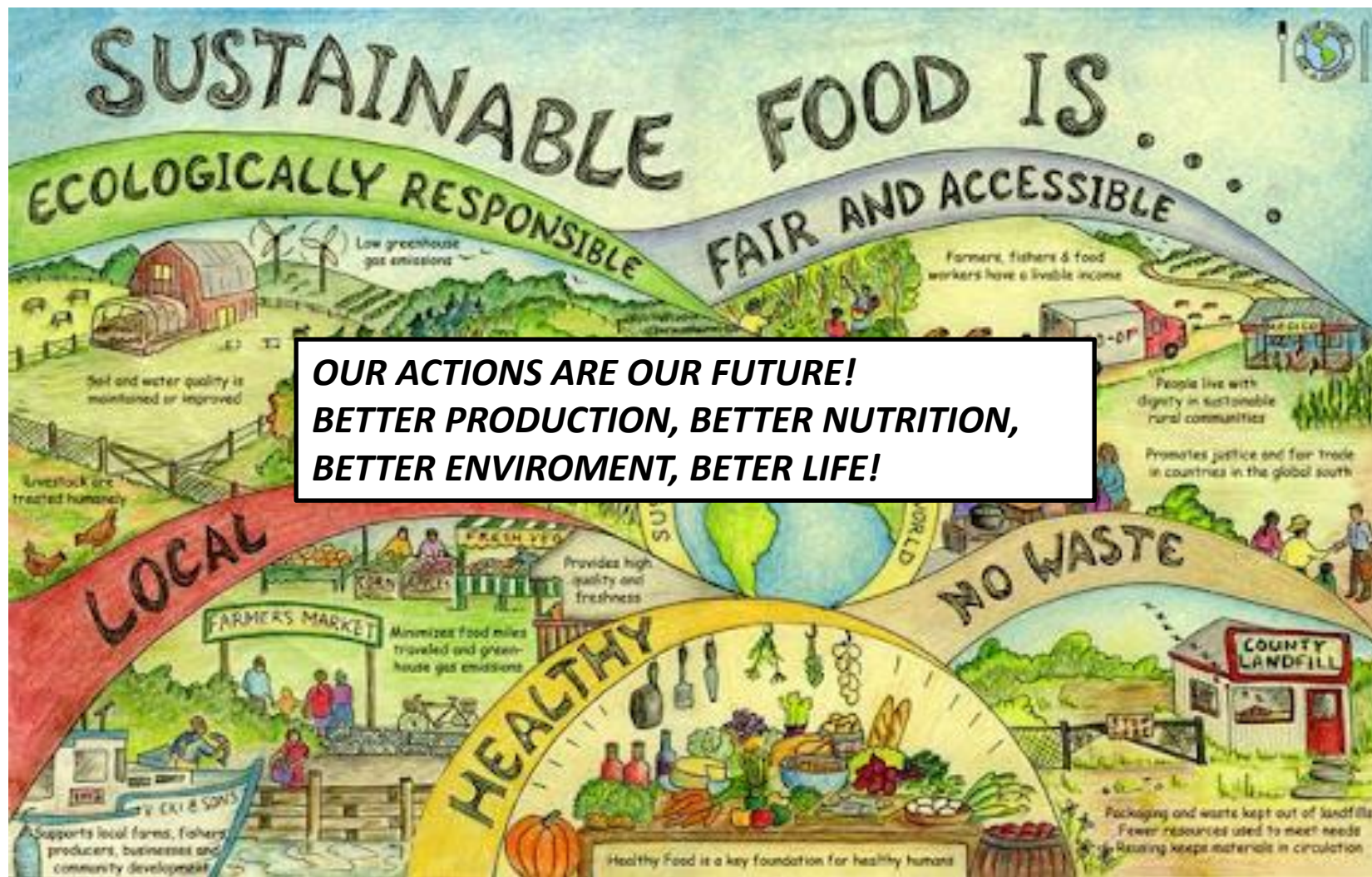
1. **NUTRITIVNI PRIORITET: HRANA BILJNOG POREKLA**
  - **1/2 DO 2/3 TANJIRA HRANA BILJNOG POTEKLA**
  
2. **ZNAČAJNO SMANJITI UNOS MESA I PROIZVODI OD MESA**
  - **NAJVEĆI DOPRINOS EMISIJI IZ POLJOPRIVREDE**
  - **KORISNA ZAMENA MAHUNARKE, JEZGRASTO VOĆE I SEMENKE**
  
3. **POVEĆATI UNOS RIBE I MORSKIH PLODOVA**
  - **REČNA I MORSKA RIBA**
  
4. **KONZUMIRATI LOKALNU GAJENU HRANU**
  - **TRANSPORT HRANE DOPRINOSI ZAGAĐENJU ŽIVOTNE SREDINE**
  
1. **JESTI RAZUMNO**
  - **↓ VELIČINU PORCIJE**
  - **BIRATI NUTRITIVNO GUSTE NAMIRNICE**
  - **↓ FOOD WASTE**

- KONZUMIRATI VOĆE, POVRĆE, MAHUNARKE, JEZGRASTO VOĆE, SEMENKE
- NAMIRNICE OD CELOG ZRNA
- NAJMANJE 400 gr (5 PORCIJA) VOĆA I POVRĆA DNEVNO
- < OD 10% DODATIH ŠEĆERA OD DEU
- < OD 30% MASTI OD DEU\*, HLADNO CEĐENA ULJA
- < OD 5 g SOLI/DAN

\* ZNAČAJNA PROMENA PREPORUKA ZA VRSTU MASTI I ULJA

- UNAPREĐENJE ZDRAVLJA
- SMANJENJE RIZIKA ZA MNB

1. World Health Organization Global action plan for the prevention and control of NCDs 2013–2020. Geneva: World Health Organization; 2013.
2. World Health Organization Guideline: Sugars intake for adults and children. Geneva: World Health Organization; 2015.
3. World Health Organization Guideline: Sodium intake for adults and children. Geneva: World Health Organization; 2012.



Slika prezeta sa: [sustainability.umich.edu/environ211/inclusivity-sustainable-food/our-goal](https://sustainability.umich.edu/environ211/inclusivity-sustainable-food/our-goal)