



National Institute
of **Public Health**

Whole grain foods in the diet of the Slovenian population

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Let's talk about grains – whole grains! 24th September 2020

Defining whole grain

- The term *grain* - plants of the *Poaceae* grass family = cereal grains and pseudocereals (amaranth, buckwheat, quinoa) ([HEALTHGRAIN Consortium 2013](#)) .
- All grains are composed of the starchy endosperm, the germ and the outer bran layer.
- There is no legally endorsed definition of whole grain and whole grain products and foods at the European level.
- The European Food Safety Authority ([EFSA 2010](#)), in a whole-grain related health claim opinion, provides the definition of the American Association of Cereal Chemists (AACC), which states that whole grain 'consist of the intact, ground, cracked or flaked [caryopsis](#), whose principal anatomical components - the starchy endosperm, germ and bran - are present in the same relative proportions as they exist in the intact caryopsis' ([AACC 2000](#))

Nutritional value of whole grains

- Grains are staple foods and constitute a major source of carbohydrate, protein and fibre for the world's population ([BNF 2004](#)). In addition, they contain vitamins (B vitamins), minerals (zinc, phosphorus, magnesium, and iron), and bioactive compounds such as antioxidants and other phytochemicals.
- Some of the beneficial health effects of whole grains are attributed to their content in those bioactive phytonutrients. However, refinement of whole grains results in a significant removal of their bioactive compounds ([AACC 2012b](#)).

Nutritional Value (/100 g raw)	Unit	White wheat flour, unenriched ¹	Whole grain wheat flour ¹
Energy	kcal	364	340
Protein	g	10.3	13.2
Total fat	g	1	2.5
Carbohydrates	g	73.6 ^a	61.3 ^a
Fibre	g	2.7	10.7
Calcium	mg	15	34
Iron	mg	1.2	3.6
Magnesium	mg	22	137
Phosphorus	mg	108	357
Potassium	mg	107	363
Sodium	mg	2	2
Zinc	mg	0.7	2.6
Thiamin (B1)	mg	0.1	0.5
Riboflavin (B2)	mg	0.04	0.2
Niacin (B3)	mg	1.3	5
Vit. B6	mg	0.04	0.4
Folate	DFE	26	44



^a USDA carbohydrate content values (referred as carbohydrate by difference) also include fibre content.

Whole grain intake: effects on health

Whole grains are considered as significant components of a healthy diet ([WHO 2015](#)).

Consumption of whole grains is associated with a reduction in the risk of developing several non-communicable diseases and related conditions:

- **Cardiovascular disease**
- **Coronary heart disease**
- **Stroke**
- **Blood pressure**
- **Effect on level of blood lipids**
- **Type 2 diabetes mellitus & blood glucose**
- **Colorectal cancer**
- **Effect on body weight/ energy intake**
- **Metabolic syndrome**

National Programme on Nutrition and Health Enhancing Physical Activity 2015-2025

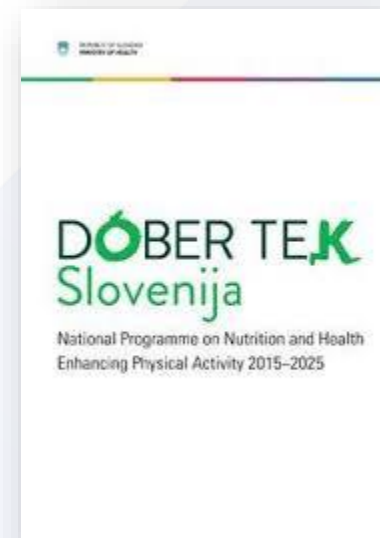
Specific targets

Increasing:

- the prevalence of breast-fed children;
- number of those having breakfast every day;
- the intake of vegetables and fruit;
- physically active population.

Decreasing/reducing:

- overweight and obese population;
- undernourished and functionally less capable elderly and patients;
- the intake of saturated fats, sugars and salt;
- the content of trans fats in food.



Recommended intake of whole grains

Whole grains are considered as an important part of a healthy eating pattern, and therefore its consumption is recommended.

DOBER TEK
Slovenija

Twelve recommendations of healthy eating (in Slovene)

1. Uživajte v hrani; jejte v rednih obrokih. Uživajte pestro hrano pretežno rastlinskega izvora.

2. Izbirajte polnovredna živila iz žit in žitnih izdelkov.

3. Večkrat dnevno imejte na krožniku svežo zelenjavo in sadje iz lokalne pridelave.

4. Nadzorujte količino zaužite maščobe in nadomestite večino nasičenih oz. živalskih maščob z nenasičenimi in nerafiniranimi vrstami olja.

5. Mastno meso in mastne mesne izdelke nadomestite s stročnicami, ribami, perutnino ali pustim mesom.

6. Vsak dan uživajte priporočeno količino posnetega mleka in manj mastnih mlečnih izdelkov.

7. Jejte manj slano hrano.

8. Omejite uživanje sladkih živil in pijač.

9. Pijte dovolj tekočine.

10. Omejite uživanje alkohola.

11. Hrano pripravljajte zdravo in higiensko.

12. Bodite dovolj telesno dejavni, da bosta vnos in poraba energije uravnotežena; tako boste ohranili primerno telesno maso.

Whole grain intake data

- Data on whole grain intake in Europe is limited. This could be because whole grains do not have a consistent definition across Europe, but also because many studies limit their scope to the intake of fibre and not whole grains as a food group.
- Global Dietary Database (GDD) for whole grain intake ([Micha et al 2015](#)). GDD data comes from governments or ministries of health, researchers and the 2010 NutriCoDE project, and includes intake of whole grain foods, such as breakfast cereals, bread, rice, pasta, biscuits, muffins, tortillas, pancakes etc. A whole grain food is defined as a food with ≥ 1.0 g of fibre per 10 g of carbohydrate ([GDD 2016](#)).

Mean daily intake of whole grain foods (g/day)

Country	Males	Females
	≥20 years	≥20 years
Belgium	11.7	12.2
Bulgaria	24	25.7
Czech Republic	14.9	15.6
Denmark	72.1	74.2
Germany	127.4	132.6
Estonia	23.6	25.9
Ireland	63.9	65.4
Greece	64.1	66.3
Spain	12	12.6
France	37.9	39.3
Croatia	2.8	2.9
Italy	11.6	12.2
Cyprus	30.4	31.5
Latvia	23.7	25.9
Lithuania	21.3	22.6
Luxembourg	65.6	67
Hungary	1.3	1.4
Malta	66.1	69
Netherlands	84.5	87.2
Austria	64.2	67.9
Poland	16	17
Portugal	66.1	69.3
Romania	16.4	17.5
Slovenia	17.9	19
Slovakia	18.9	20.1
Finland	69.5	72.2
Sweden	78.5	80

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<https://ec.europa.eu/jrc/en/health-knowledge-gateway/promotion-prevention/nutrition/whole-grain>

Dietary studies in Slovenia

1997

- Prehrambene navade prebivalcev Slovenije z vidika zdravja I (FFQ)
- Koch, 1997

2007/08

- Prehrambene navade odraslih prebivalcev Slovenije z vidika zdravja II (FFQ/units, subsample 24h recall 1d)
- Gabrijelčič Blenkuš, Gregorič, Tivadar, et al., 2009

2017/18

- SI.Menu (24h-recall 2 d; FPQ)
- Gregorič, Blaznik, Delfar, et al., 2019





Slovenian Dietary Survey according to EFSA EU Menu methodology

„SI.Menu
2017/18“



Target populations

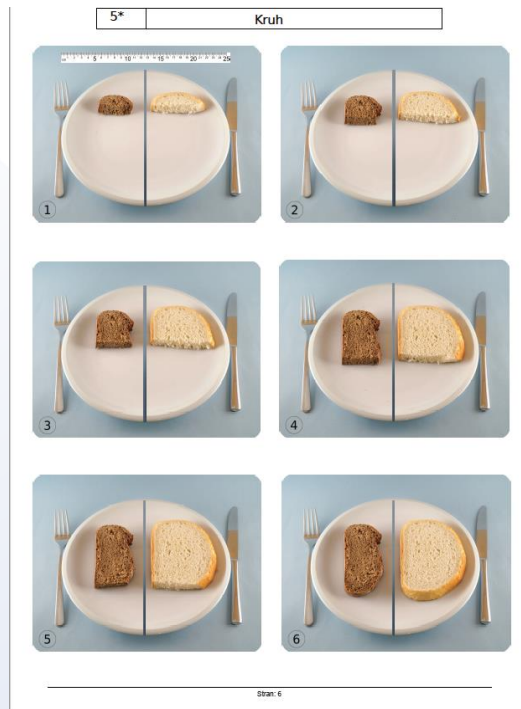
- Infants (3-11 m)
- Toddlers (1-2 y)
- Adolescents (10 – 17 y)
- Adults (18 – 64 y)
- Older adults (65 – 74 y)



	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 %

Age, gender representative national data

Whole grain food in the SI.Menu survey tools



FPQ: consumption frequency of whole grain bread (all grains), flakes, porridge, buckwheat porridge, buckwheat flour
24h-recall

Wholemeal* bread – consumption frequency

- Consumption frequency :

*Wholemeal bread is made from whole grain flour

	toddlers	adolescents	adults	older adults
high (every day/ 4-6 times per week)	39,1 %	30,6 %	40,5 %	58,0 %
never	6,7 %	15,3 %	12,5 %	9,9 %

Average high wholemeal bread consumer in Slovenia: female, older adult, eastern part of SI

Comparison with the 2007 survey: Wholemeal bread is occasionally eaten by 27% of the population, while 31% do not eat it at all (Gabrijelčič Blenkuš et al., 2009).



Wholemeal bread - intake

Wheat* bread and rolls, brown or wholemeal
*(Triticum spp.)

Population Group	Number of subjects	Number of consumers	Mean g/day
Toddlers	343	98	9,15
Adolescents	484	132	17,75
Adults	385	131	28,41
Older adults	450	214	48,75



All data: EFSA Comprehensive Food Consumption Database, SI.Menu Survey

Rye bread and rolls, wholemeal

Population Group	Number of subjects	Number of consumers	Mean g/day
Toddlers	343	3	0,19
Adolescents	484	6	0,49
Adults	385	6	0,73
Older adults	450	7	0,48

Multigrain (not only rye-wheat) bread and rolls

Population Group	Number of subjects	Number of consumers	Mean g/day
Toddlers	343	11	0,77
Adolescents	484	12	1,67
Adults	385	14	1,90
Older adults	450	11	1,17

Oat grains and porridge

- Consumption frequency

No data just for oat products.

All rolled grains and porridge (no added sugar) – 20.5% of older adults, 30.0% of adults, 43.6% of adolescents and 68.3% of toddlers at least once weekly consumes rolled grains and porridge. High consumers are women (14,8 %), adult, from suburbs, with higher education and higher material standard.

- Intake

Oat rolled grains and oat porridge	
Population Group	Mean g/day
Toddlers	3,03
Adolescents	2,30
Adults	2,50
Older adults	2,02



Buckwheat flour and buckwheat products

- Consumption frequency

Buckwheat flour and buckwheat products are consumed every day by only 0.2%, once a week by 16.3%, 1 - 3 per month by 46.8% and never by 31.9% of the adolescents and adult population of Slovenia. 31,1 % of toddlers consume buckwheat flour and buckwheat products at least once per week.

- Average high consumer of buckwheat is older adult man.

- Intake

Buckwheat flour and products			
Population Group	Number of subjects	Number of consumers	Mean g/day
Toddlers	343	3	0,38
Adolescents	484	9	0,45
Adults	385	4	1,02
Older adults	450	18	1,80



Other whole grain products

Population Group		Number of subjects	Number of consumers	Mean g/day
Toddlers	Crisp bread, rye wholemeal	343	1	0,15
Toddlers	Rusk, wholemeal	343	3	0,15
Toddlers	Biscuits, sweet, wheat wholemeal	343	7	0,36
Toddlers	Pasta wholemeal	343	4	0,16
Adolescents	Rusk, wholemeal	484	1	0,02
Adolescents	Quinoa grain	484	1	0,10
Adolescents	Biscuits, sweet, wheat wholemeal	484	6	0,46
Adolescents	Pasta wholemeal	484	3	0,15
Adults	Quinoa grain	385	2	0,45
Adults	Biscuits, sweet, wheat wholemeal	385	9	0,59
Adults	Pasta wholemeal	385	6	0,56
Older adults	Rusk, wholemeal	450	10	0,97
Older adults	Biscuits, sweet, wheat wholemeal	450	4	0,39
Older adults	Pasta wholemeal	450	3	0,15

No. of consumers are low.
The amounts consumed are low.
New wholegrain products
Quinoa – adolescents, adults

Whole grain food and safety

- Whole grains represent a significant source of food-borne contaminants - mycotoxins including aflatoxin B1; ochratoxin A; fumonisin B1; deoxynivalenol; zearalenone; toxic metals like arsenic, cadmium and lead; as well as process contaminants such as acrylamide.
- Whole grains usually contain more contaminants than refined products.
- The risk posed by contaminants from whole grains do not outweigh the known nutritional benefits of whole grain consumption.

Whole grain is much more...

The knowledge or rediscovery of already forgotten grains is increasing among the population of Slovenia.

Wholegrain foods include wholegrain breads, wholegrain pasta and wholegrain breakfast cereals, brown rice, barley, rye, traditional rolled oats, bulgur, sorghum, buckwheat, millet, quinoa, corn on the cob, corn kernels, semolina, polenta.

Because of the many benefits that wholegrain foods have for our health, we support all initiatives to increase availability and accessibility of these products.

Thanks for your attention!



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