»Abeceda trendov povpraševanja po hrani v Sloveniji«

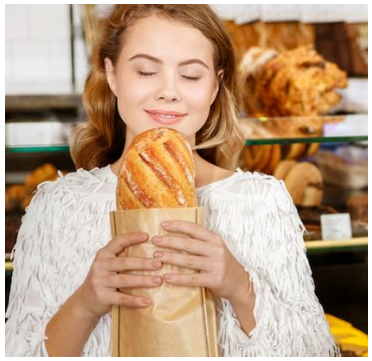
petek, 5. april 2019 GZS, Dimičeva 13, 1504 Ljubljana

Odziv potrošnika na zmanjšanje soli v kruhih

dr. Aleš KUHAR[1], dr. Hristo Hristov[2], dr. Mojca Korošec[1]

[1]*Univerza v Ljubljani, Biotehniška fakulteta*

[2]*Inštitut za nutricionistiko*



Katedra za agrarno ekonomiko, politiko in pravo

Univerza v Ljubljani

UVOD

- Natrij ima **ključno vlogo** pri vzpostavljanju ozmotskega tlaka v krvi in tkivih *(Lean, 2006)*
- Fiziološke potrebe po natriju je moč pokriti **zgolj s prehrano** *(Durack et al., 2008)*, pri čemer je kuhinjska sol njegov najpomembnejši vir *(Jebb, 2005).*
- Priporočen / referenčni dnevni vnos natrija ????
- Podatki, ki so na voljo, kažejo da tudi **Slovenci zaužijemo preveč soli** => srčno-žilne bolezni…
- Med 60-90% soli populacija **zaužije s pripravljenimi ži**vili, preostalo je dosoljevanje.
- Med možnimi pristopi k zmanjševanju zauživanja soli sta v ospredju: **izobraževanje** potrošnikov in **samoregulacija** živilskopredelovalne industrije.

UVOD

nadaljevanje

- Intenziviranje R&D-ja v smeri zniževanja/zamenjave soli *(alternative)*
- Realni izzivi zniževanja soli v živilih: varnost, kakovost in senzorična sprejemljivost…
- Sol v živilih ima pomembne tehnološke funkcije: *antimikrobne lastnosti, tekstura… (Albarracín et al., 2011).*
- Sprejeta je paradigma, da postopno kolektivno (!?) zmanjševanje vsebnosti soli privede do „prilagoditve okusa“ *(Bertino et al., 1982; Mitchell et al., 2011)*
- „Prosti strelci“, ki niso del kolektivne akcije zmanjševanja, so celo izgubljali tržne deleže, ker so bili njihovi izdelki preslani *(Wyness et al., 2012)*
- Previdnost pri aktivnostih reformulacije je nedvomno potrebna – velika poslovna tveganja

CILJI IN PROTOKOL RAZISKAVE

Cilji

- Analiza občutljivost slovenskih potrošnikov na zniževanje vsebnosti soli v kruhih.
- Preprečiti negativen odziv pri potrošnikih zaradi prevelikega znižanja slanosti - senzorične spremembe
- Informirana razprava v smeri reformulacije

Protokol

- Senzorično testiranje s potrošniki
  - Vzorci belega in mešanega pšeničnega kruha z vsebnostjo soli *(1,1 g/100 g, 1,3 g/100 g, 1,4 g/100*
- Kratek kvalitativni del – pojasnjevalne spremenljivke
  - nakupno in potrošno vedenje
  - prehranjevalne navade
  - vedenje in odnos do soli
  - socio-demografija.

Raziskava SOL-2019

OPIS VZORCA

Characteristics		n	%
Gender	Male	76	38.0
	Female	124	62.0
Age (years)	Less than 35	91	45.5
	More than 35	109	54.5
Education	High school or less	86	43.0
	College or university	114	57.0
Status	Student	42	21.0
	Employed	136	68.0
	Without full-time job	4	2.0
	Retired	18	9.0
Income	very below average	23	11.5
	average	133	66.5
	above average	44	22
How often do you consume bread?	Heavy users (once or few times a day)	113	56.5
	Light users (few times a week or less)	87	43.5

Raziskava SOL-2019

REZULTATI

Senzorično testiranje s potrošniki

Table 2. Sensory testing results – mean liking (n=200)

Test with bread - TASTE	**White bread**		**Mixed bread**	
	All participants		All participants	
	Mean* (SD)	p**	Mean* (SD)	p**
Sample 1 – 1.1 g of salt/100 g	4.79 (1.35)	>0.05	3.84[a] (1.52)	0.00
Sample 2 – 1.3 g of salt/100 g	4.74 (1.33)		4.27[b] (1.47)	
Sample 3 – 1.4 g of salt/100 g	4.78 (1.35)		4.14[b] (1.48)	

Table 3. Associations between white bread sensory test and socio-demographic characteristics

*Test with **white** bread - TASTE*	Gender			Age			Education		
	Male	Female	p**	≤35	>35	p**	Lower	Higher	p**
	Mean* (SD)			Mean* (SD)			Mean* (SD)		
Sample 1 – 1.1 g of salt/100 g	4.99 (1.33)	4.67 (1.35)	U=4006,50; p>0.05	4.86 (1.34)	4.72 (1.36)	U=4643,50; p>0.05	5.02 (1.48)	4.60 (1.22)	U= 4112,50; p<0.05
Sample 2 – 1.3 g of salt/100 g	4.92 (1.26)	4.63 (1.36)	U=4091,50 p>0.05	4.92 (1.33)	4.59 (1.32)	U=4308,50; p>0.05	4.98 (1.51)	4.56 (1.15)	U=3983,00; p<0.05
Sample 3 – 1.4 g of salt/100 g	5.01 (1.38)	4.63 (1.31)	U=3951,00 p<0.05	4.87 (1.47)	4.70 (1.24)	U=4573,50; p>0.05	4.99 (1.31)	4.61 (1.36)	U=4142,50; p<0.05

Table 4. Associations between mixed bread sensory test and socio-demographic characteristics

*Test with **mixed** bread - TASTE*	Gender			Age			Education		
	Male	Female	p**	≤35	>35	p**	Lower	Higher	p**
	Mean* (SD)			Mean* (SD)			Mean* (SD)		
Sample 1 – 1.1 g of salt/100 g	3.89 (1.47)	3.81 (1.54)	U=4617,00 p>0.05	3.74 (1.57)	3.93 (1.47)	U=4544,50; p>0.05	3.88 (1.60)	3.81 (1.46)	U=4773,50; p>0.05
Sample 2 – 1.3 g of salt/100 g	4.38 (1.31)	4.20 (1.56)	U=4443,50 p>0.05	4.32 (1.57)	4.23 (1.38)	U=4808,50; p>0.05	4.42 (1.61)	4.16 (1.34)	U=4368,00; p>0.05
Sample 3 – 1.4 g of salt/100 g	4.05 (1.42)	4.19 (1.52)	U=4526,00 p>0.05	4.18 (1.52)	4.11 (1.45)	U=4816,00; p>0.05	4.22 (1.64)	4.08 (1.36)	U=4649,50; p>0.05

REZULTATI

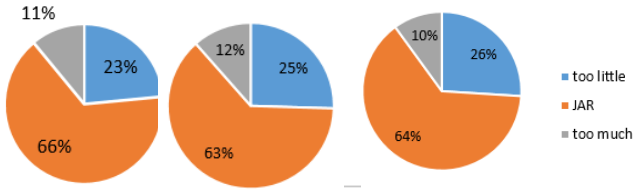
Senzorično testiranje s potrošniki
VŠEČNOST

Table 5. Associations between sensory test and frequency of bread consumption

Test with bread - TASTE	White bread			Mixed bread		
	Heavy bread users	Light bread users	p**	Heavy bread users	Light bread users	p**
	Mean* (SD)			Mean* (SD)		
Sample 1 – 1.1 g of salt/100 g	4.96 (1.31)	4.56 (1.37)	U=4148,00; p>0.05	3.96 (1.54)	3.69 (1.47)	U=4530,50; p>0.05
Sample 2 – 1.3 g of salt/100 g	4.88 (1.32)	4.56 (1.34)	U=4338,50; p>0.05	4.30 (1.49)	4.23 (1.44)	U=4723,50; p>0.05
Sample 3 – 1.4 g of salt/100 g	4.90 (1.38)	4.61 (1.29)	U=4367,50; p>0.05	4.18 (1.58)	4.09 (1.36)	U=4860,50; p>0.05

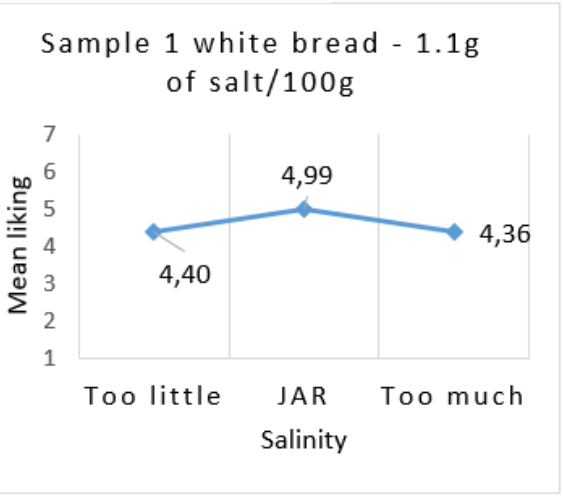
- Rezultati o vplivu koncentracije soli na všečnost kruhov so precej „nezaključljivi“…

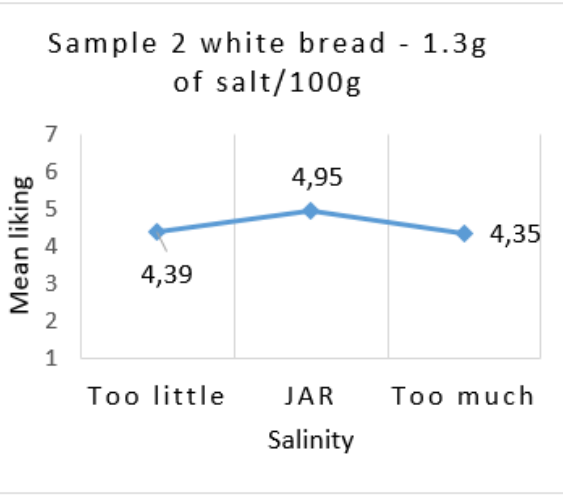
Raziskava SOL-2019

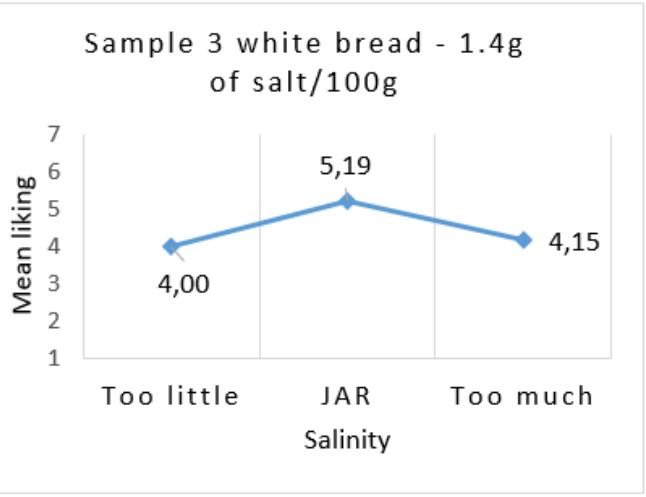


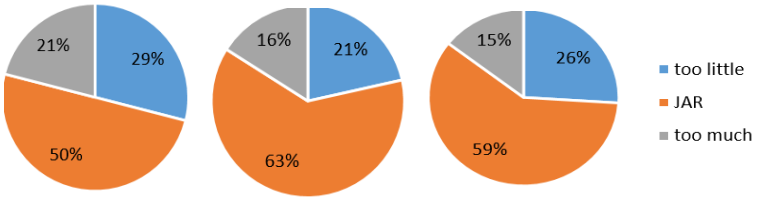
REZULTATI

Senzorično testiranje s potrošniki
SLANOST-JAR+VŠEČNOST

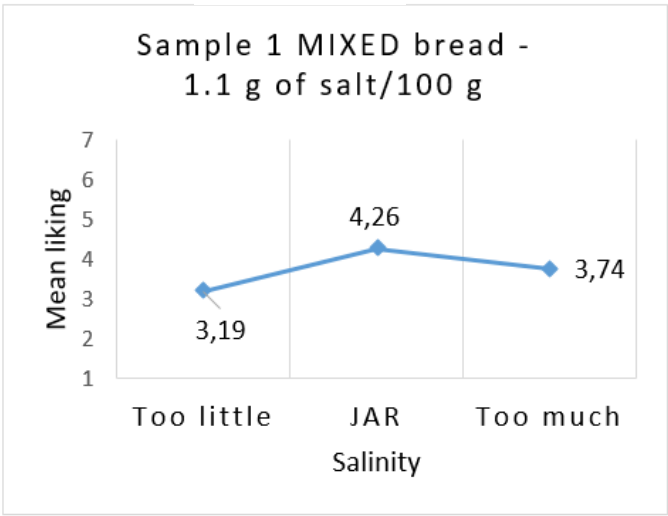


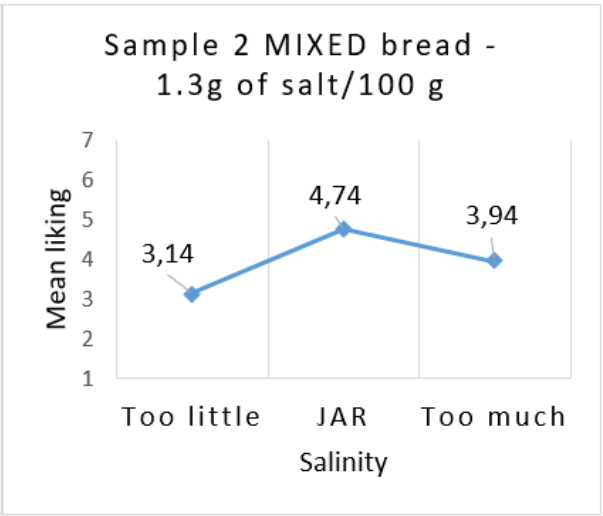


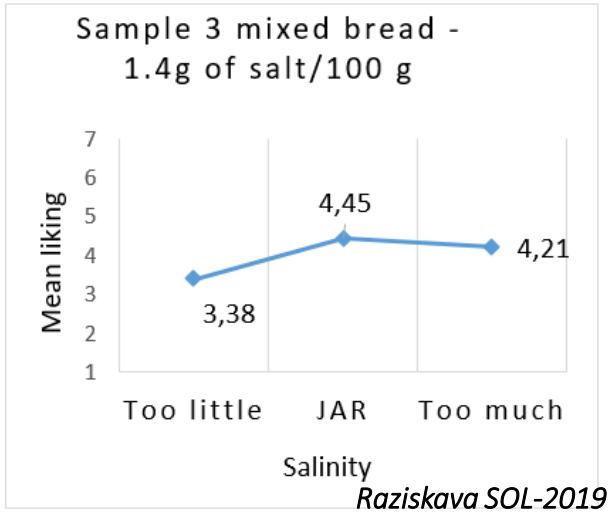




Kaže, da so mešani kruhi „bolj problematični“.







Raziskava SOL-2019

Klasterska analiza latentnih razredov

Senzorično testiranje s potrošniki

LCCA

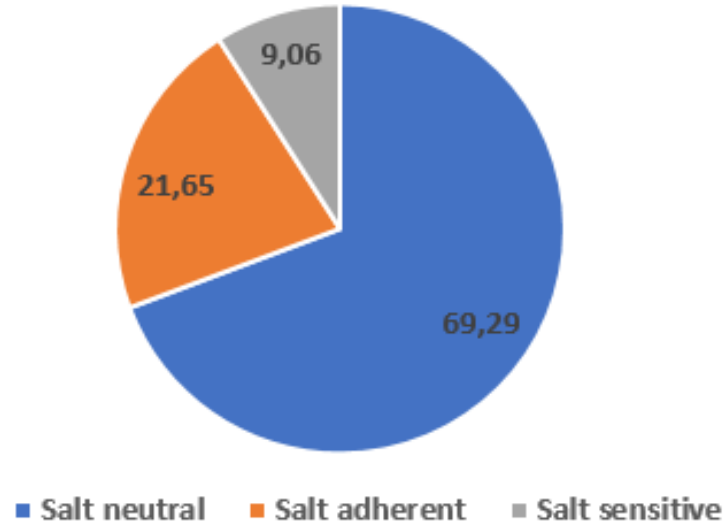
$$f(\mathbf{y}_i|\theta) = \sum_{k=1}^{K} \pi_k f_k(\mathbf{y}_i|\theta_k)$$

- y_i vrednosti opazovanih spremenljivk individuma
- *K* število klastrov
- *k* verjetnost uvrstitve v latentni razred /klaster/

Distribucija y_i ob danih parametrih modela θ, $f(\mathbf{y}_i|\theta)$ je sestavljena iz klastrsko specifičnih distribucij $f_k(\mathbf{y}_i|\theta_k)$

Table 3. Latent class cluster models' goodness-of-fit measurements (N=200)

Model	LL	BIC_{LL}	AIC_{LL}	G^2	N(par)	df	*p*-value
One-cluster model	-1257,3739	2636,609	2560,7477	757,8377	23	177	7,6E-73
Two-cluster model	-1199,7244	2558,3982	2459,4487	642,5387	30	170	4,6E-56
Three-cluster model	-1171,313	2538,6637	2416,626	585,716	37	163	5,1E-49
Four-cluster model	-1162,3205	2557,7671	2412,6411	567,7311	44	156	3,8E-48



Raziskava SOL-2019

Klasterska analiza latentnih razredov

Senzorično testiranje s potrošniki
LCCA

Bread mean preference score total and per clusters (one-type ANOVA analysis with single effect - clusters

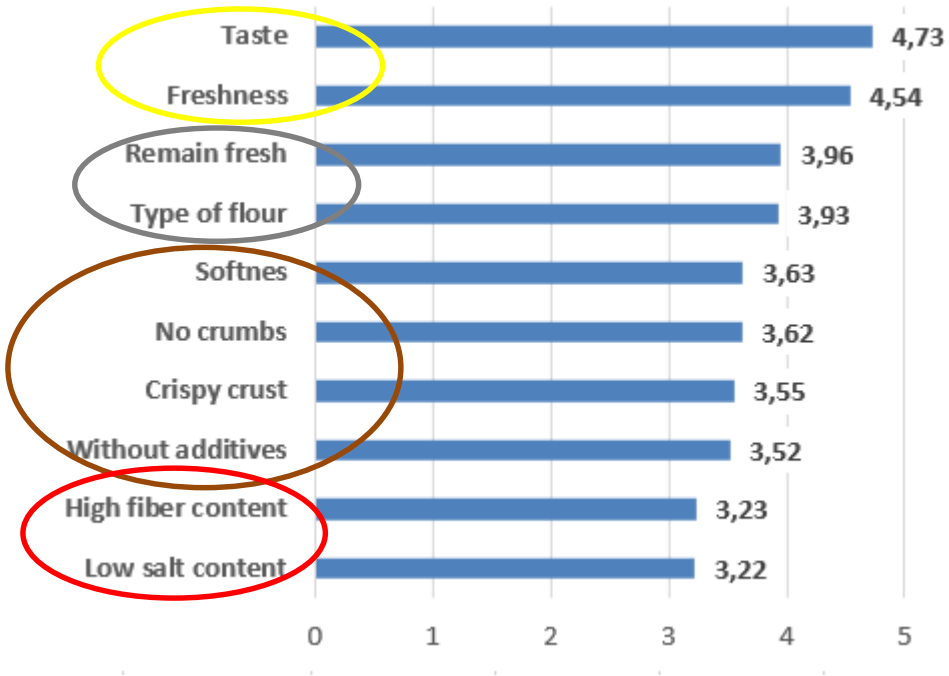
Type of bread	Clusters	Mean	SD	P*
white bread 1 (1.1g of salt/100g)	Cluster 2 (21.5%) Salt adherent	4,67	1,44	0,280
	Cluster 1 (68.5%) Salt neutral	4,88	1,34	
	Cluster 3 (10.0%) Salt sensitive	4,4	1,14	
white bread 2 (1.3g of salt/100g)	Cluster 2 (21.5%) Salt adherent	4,49	1,44	0,350
	Cluster 1 (68.5%) Salt neutral	4,82	1,29	
	Cluster 3 (10.0%) Salt sensitive	4,7	1,34	
white bread 3 (1.4g of salt/100g)	Cluster 2 (21.5%) Salt adherent	4,19	1,31	0,010
	Cluster 1 (68.5%) Salt neutral	4,95	1,32	
	Cluster 3 (10.0%) Salt sensitive	4,85	1,31	
mixed bread 1(1.1g of salt/100g)	Cluster 2 (21.5%) Salt adherent	3,42	1,56	0,080
	Cluster 1 (68.5%) Salt neutral	4	1,45	
	Cluster 3 (10.0%) Salt sensitive	3,65	1,72	
mixed bread 2 (1.3g of salt/100g)	Cluster 2 (21.5%) Salt adherent	3,86	1,44	0,120
	Cluster 1 (68.5%) Salt neutral	4,38	1,41	
	Cluster 3 (10.0%) Salt sensitive	4,4	1,76	
mixed bread 3 (1.4g of salt/100g)	Cluster 2 (21.5%) Salt adherent	3,7	1,52	0,060
	Cluster 1 (68.5%) Salt neutral	4,23	1,46	
	Cluster 3 (10.0%) Salt sensitive	4,5	1,4	

REZULTATI

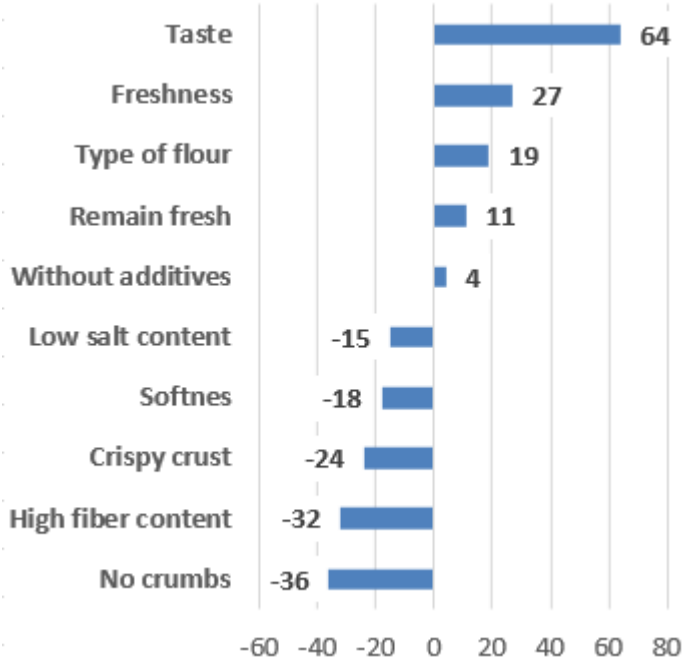
Nakupno in potrošno vedenje

DEJAVNIKI NAKUPA ZA KRUH

Mean score



B-W score

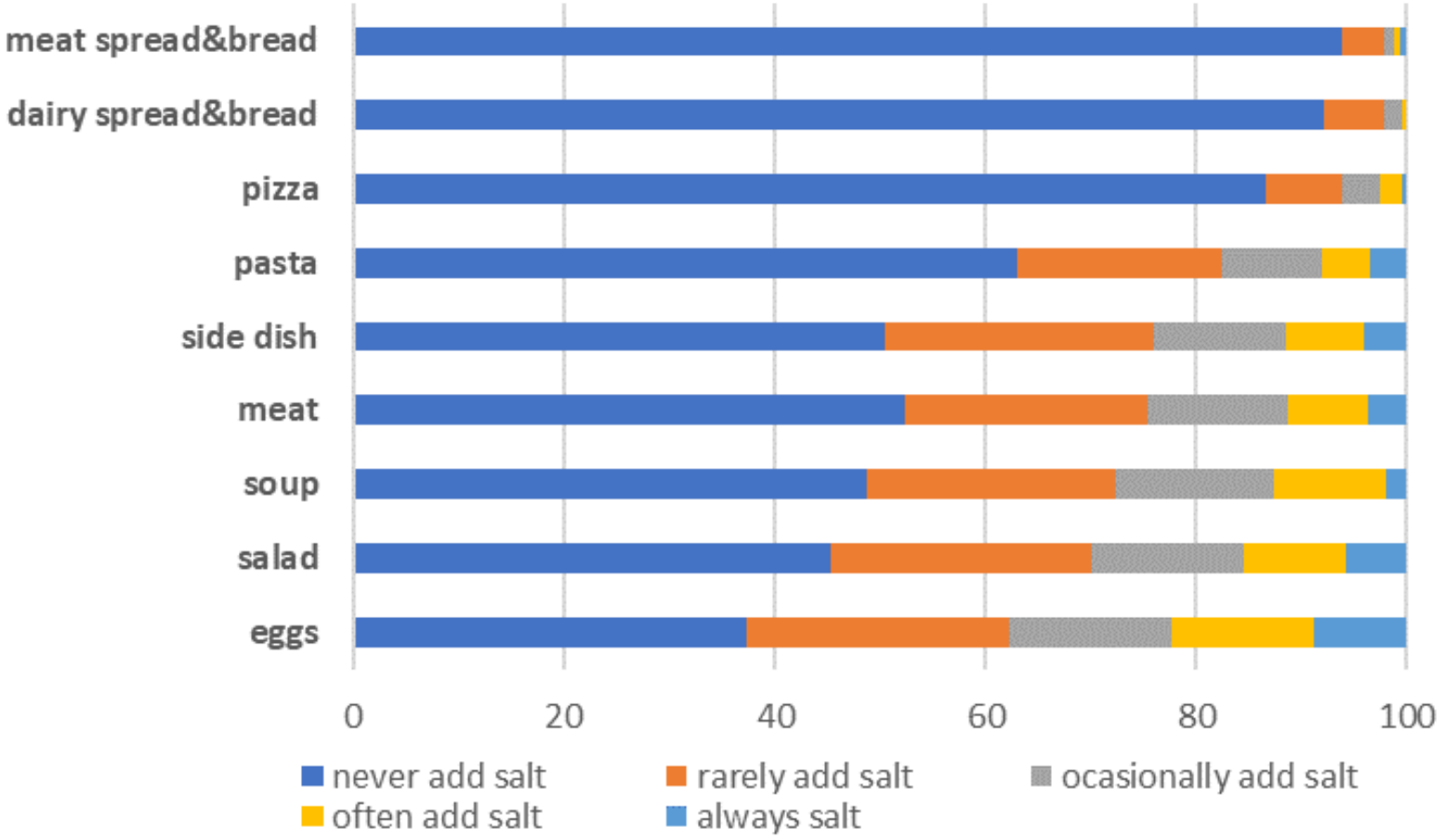


Raziskava SOL-2019

REZULTATI

Vedenje in odnos do soli
DOSOLJEVANJE

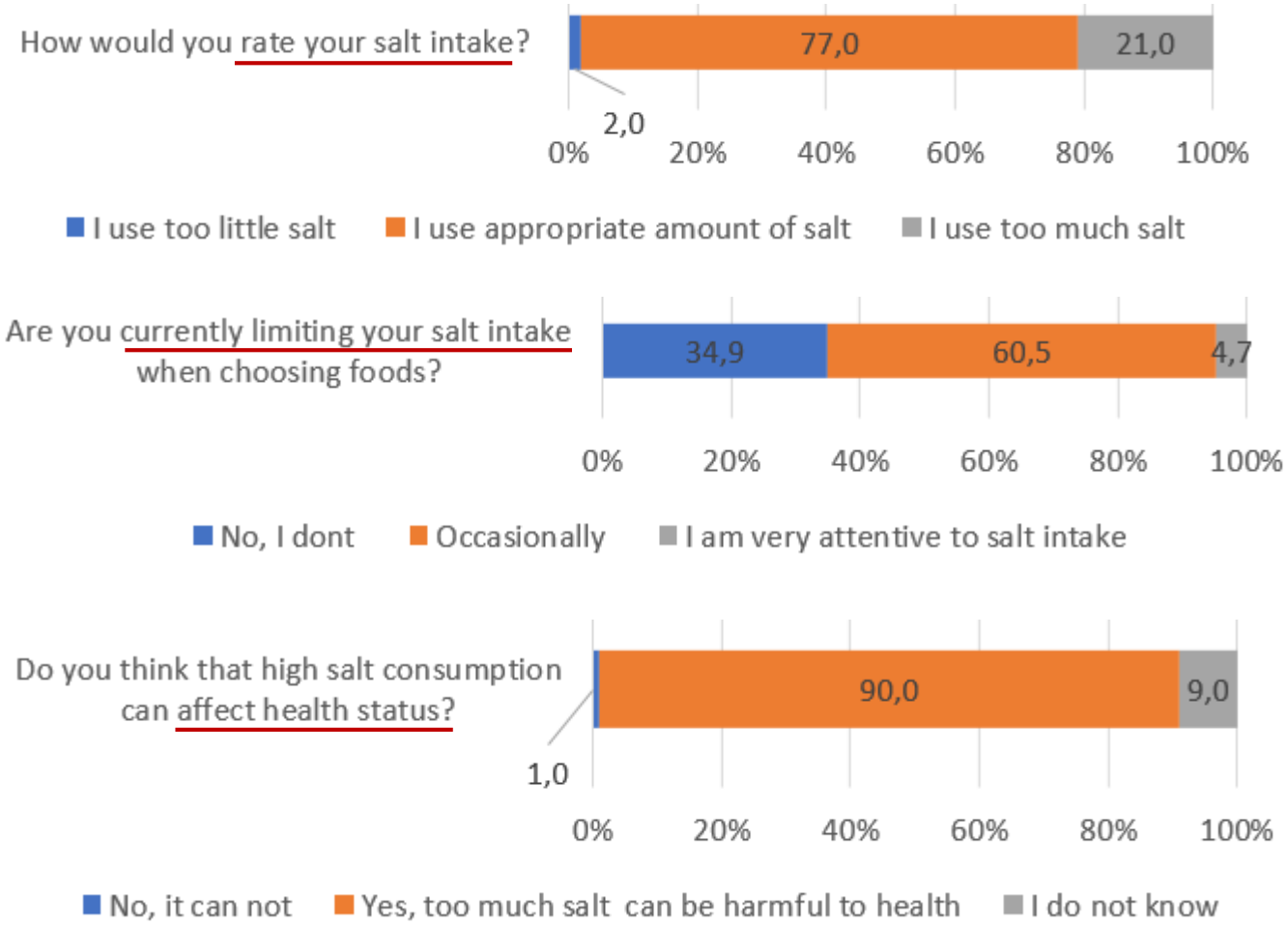
Dosoljevanje



Raziskava SOL-2019

REZULTATI

Vedenje in odnos do soli

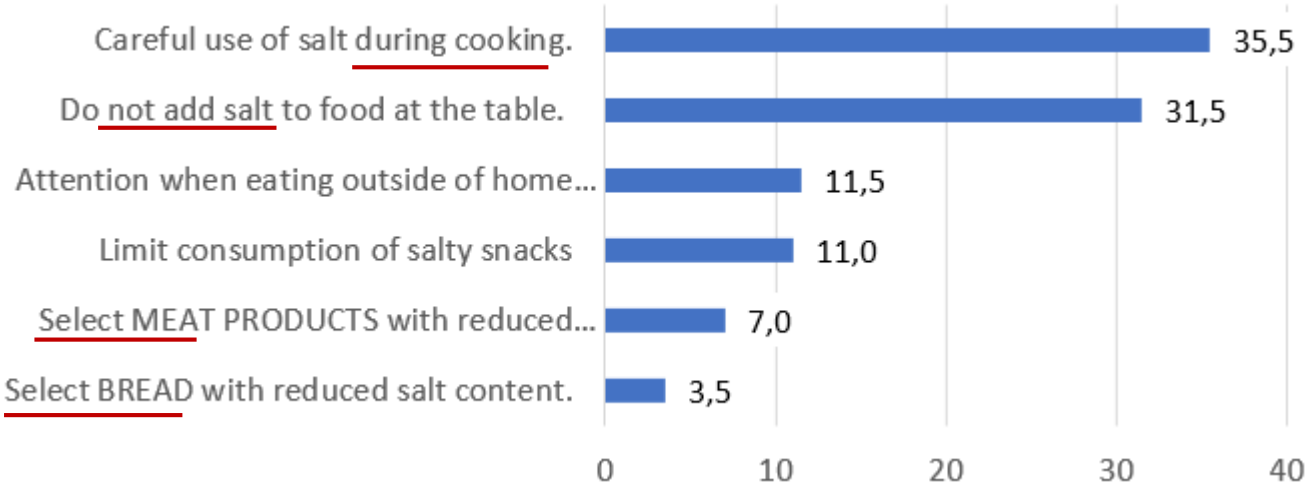


Raziskava SOL-2019

REZULTATI

Vedenje in odnos do soli
DOSOLJEVANJE

Najprimernejši način omejevanja vnosa soli

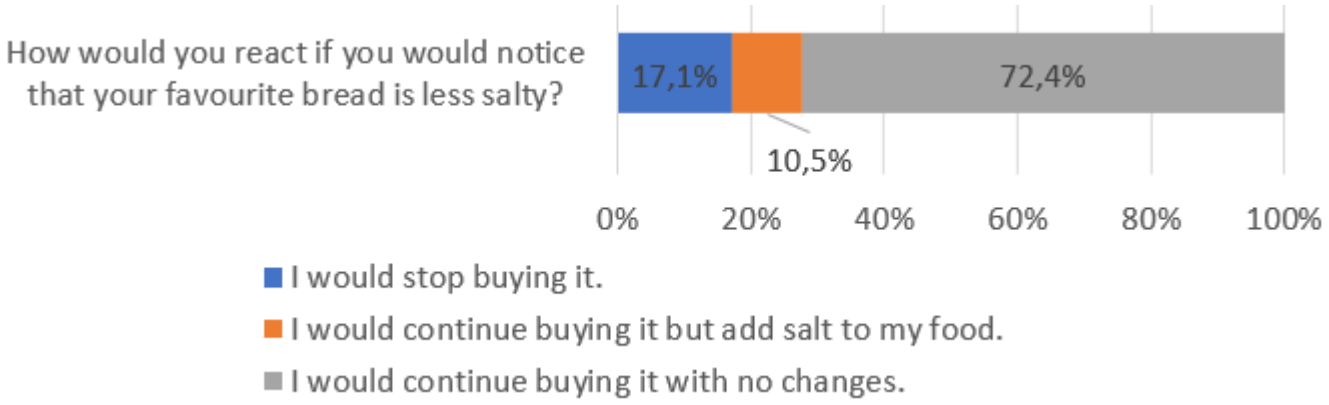


Raziskava SOL-2019

ZAKLJUČKI

- Rezultati analize kažejo, da udeleženci zaznavajo spremembe vsebnosti soli, vendar vzorci niso značilni in zelo izraziti.
- Obstaja možnost za postopno, kolektivno in zmerno reformulacijo.
- Pomembne *(?!)* deficite *(še vedno)* na področju:
  - znanja ni zavedanja o vnosu soli;
  - možnih strategijah za (morebitno) zmanjšanje vnosa soli!
- Aktivnosti so usklajene, kar kaže dobre obete…

SPODBUDA???


How would you react if you would notice that your favourite bread is less salty?
17,1%
10,5%
72,4%
0%
20%
40%
60%
80%
100%
I would stop buying it.
I would continue buying it but add salt to my food.
I would continue buying it with no changes.

»Abeceda trendov povpraševanja po hrani v Sloveniji«

petek, 5. april 2019 GZS, Dimičeva 13, 1504 Ljubljana

HVALA!