

EATING HABITS - FAST FOOD AND BODY MASS INDEX⁶³

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ABSTRACT

Introduction / Using sweetened soft drinks, the habit of eating on the way, increased the probability of overweight and obesity. (Libman, 2003) In America, 25% of adults eat fast food.(Bowman, 2006) The density of fast-food restaurants is connected with increase in the individual body weight.(Mehta, 2008) Children who more often eat in restaurants, have high fat levels and high body mass index.(Jeffery, 2006) **Method** / We used the results of research factors that determine body mass index, within the Health Research in the adult population of Serbia, in 2006 and 2013 by type of study sections. As data sources were used questionnaires, and anthropometric and other measurements. **Results** / Respondents who do not eat sandwiches, chips and pastries at the bakery, have the highest BMI. Our results suggest that fast food in the diet, correlates with a lower body mass index. These results are opposite to most studies in the world (America). This situation among our subjects, can be explained by dynamically life of people who use fast food and increased physical activity. **Conclusion** / Consumption of fast food does not have to have a negative correlation with nutritional status. If this is supported with the desired intensity of physical activity and represents a lifestyle, then this is an opportunity of society, or restaurants that sell and prepare food, to design high-quality food offer.

Keywords: fast food, body mass index, the society

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INTRODUCTION

Many studies in the world, mainly in America, referring to the results of research on the effect of dietary habits - fast food diet, the body mass index and the role of modifying factor- physical activities and actions, age, socio-economic conditions. Frequency of sweetened soft drinks, ordering large portions of food, the development of habit to eat along the way, while driving a car, watching TV, doing other activities, that increase the likelihood of overweight or obesity. (Liebman, 2003) In their study, Bowman tested the link between nutrition and the status of obesity in adults who ate fast food at least once during the two-day studies comparing energy input and micronutrients and reported that 25% of adults eat fast food and that their body mass index higher of those who do not consume fast food. When you exclude the impact socioeconomic and demographic variables, increased energy intake and decreased micronutrients, can also be linked with the introduction of fast food. (Bowman 2006) More frequent dining at fast food restaurants is characteristic of children who have high blood fat levels and high body mass index. Jeffery (2006), Mehta (2008) in their research came to the conclusion that the density and the number of fast food restaurants correlates with the increase in individual body mass index, that the increase in the number of fast food restaurants in the neighborhood associated with an unhealthy lifestyle, poor psychosocial profile and increasing the risk of obesity. On the other side, Inagami (2009) came to the result that the use of fast-food restaurants and the concentration of the same sale, can be linked with body mass index and car ownership modify this association. Consumers who own a car, have a higher body mass index compared to those who do not have a car.

METHOD

The paper used data from the survey "Factors that determine the Body Mass Index of the Adult Population in Serbia" by type-sectional study, carried out within the research "Health of the population of Serbia" in 2006 and 2013 conducted by the Serbian Ministry of Health, with financial and technical support World Bank (the project "Development of Health of Serbia"), the World Health Organization (Regional Office for Europe) and the Institute of Public Health of Serbia "Dr Milan Jovanović Batut". The main represent is an entire population of Serbia aged 20 and over.

The sample was selected so as to provide a statistically reliable estimate of the large number of indicators showing the health of the

population at the national level - six major powers (Vojvodina, Belgrade, Western, Central, Eastern and Southeastern Serbia) and city and other settlements. Source of information on household respondents and questionnaires, were made as recommended by the representative of foreign studies (North Carelia Study, FINBALT research). All measurements were performed pre-trained persons defined by standardized procedures. Statistical methods were used: Exploratory Data Analysis, Descriptive statistics, One-way Analysis variance- One Way ANOVA, Leven's test, One-Way ANOVA Post-Hoc tests, Multiple Linear Regression, Method Stepwi.

RESULTS

Respondents who do not eat sandwiches, chips and pastries in a bakery, have the highest BMI, statistically highly significant. The lowest values of BMI in subjects who consume 3 to 5 times a week this food, sandwiches, patties, muffins, pies. ($p < 0.001$)

(Table 1).

The largest number of respondents eat white bread (58%). The lowest values of BMI in subjects who consumed white bread, and especially those who eat dark and rye bread.

($p < 0.001$) Since prayer is mostly used margarine in the diet (36%). The lowest value of the respondents who have a BMI smear mayonnaise (24, 81), and the highest in those who smear margarine. (26.27) ($p < 0.001$) Respondents who never add salt to food (25.95) compared to those who add, had a significantly higher BMI (26.39). ($p < 0.001$) Type of fat that used in food preparation, as well as thinking about your health during the election foods, do not affect BMI. ($p > 0.05$) (Table 2)

The regression model -is allocate variable - How often have you eaten during the last week or drinking: chips with a 0.8% impact on the variability of ITM. When we add the chicken, the impact increases to 1.3%, from sweets to 1.4% with cheese to 1.6%, non-alcoholic beverages to 1.7%, to 1.8% sandwiches and meat products, without changes, 1.8%. The strongest factor is the chips. (Table 3)

From Table 4 ITM and bread, spreads, kind of fat for cooking, added salt, apparently the strongest effect on variability ITM with 0.2% has factorization bread. When you add the salt and fat, the effect is increased to 0.3%. The most important variable is the bread.

(Table 4)

Respondents who never think about health are numerous and have the lowest BMI, compared to those who are constantly thinking. (Table 2)

DISCUSSION

The results of research in the world, mainly America, saying that there is a positive association between fast food consumption and body mass index in adults and children (Jeffery, 2006; Mehta, 2008) That the presence of fast food in the diet of students is associated with greater energy intake and reduced intake micronutrients, and reduced physical activity. (Trushna, 2014) Fast food consumption is higher if it is closer is available in the neighborhood and correlates with low socioeconomic status families. (Latetia, 2009, Jiao, 2015) On the other hand, Fast food is quite popular among children, thanks to the custom taste, appearance and special advertising in the media. (Nitin, 2015) Virtanen in his study found that the risk of obesity in adolescents better economic status lower than in poorer. The richer teens have better eating habits. They do not run to a neighboring fast food shops and do not skip breakfast and free school lunches, as opposed to those with a low socio-economic status. (Virtanen, 2015; Mukesh, 2014)

Our results indicate the opposite situation, individuals who consume fast food have a lower body mass index. Consuming fast food subjects with lower BMI compared to those who do not consume the same, can be explained by modifying factors, dynamic life of people who consume fast food, full of suspense and uncertainty, their greater physical activity, age (younger age), they do not come to think of food, and not about their health, have a lower socioeconomic status. These results are supported by research conducted by Mukesh and came to the conclusion that fast food and soft drinks in the diet, leading to malnutrition. (Sokolova, unpublished thesis)

Research on a large sample of 13,102 adult residents of New York, showed that the proximity and number of health food stores (supermarkets, shops of fruit and vegetables, organic food shops) reversed linked with the amount of BMI in the population in the analyzed area. Modifying effects of gender, age, race and ethnic origin of respondents, income and level of education were not significant. (Rundle, 2009)

Our respondents with the highest BMI, never add salt to food and eating rye bread. The strongest factorization foods that have the strongest impact on the variability of the ITM are chips and white bread. They are most common in the spectrum of fast food.

Frequent consumption of eggs and meat products, fast food, white bread, mayonnaise, added salt foods, negatively correlated with BMI. The same is the case with a group of food cookies, cakes, candies, chocolate and sweet soft drinks.

In a survey of the adult population of the Serbian population (Sokolova, unpublished thesis), the strongest influence on BMI factor has self respect. The less self-esteem, decreased interest in their own health and look, higher BMI.

Table 1
BMI compared to the weekly frequency of intercourse fast food in the examined population

Mark	Category	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Min	Max	F	Sig.
						Lower Bound	Upper Bound				
Sendvich											
Is5-19	Never	8046	26,5477	4,75208	,0529	26,4439	26,6516	13,29	50,25	37,819	,000
	1 to 2 times	3640	25,8193	4,62191	,0766	25,6691	25,9695	13,63	49,95		
	3 to 5 times	1634	25,2670	4,34039	,1073	25,0564	25,4776	15,72	46,21		
	6 to 7 times	426	25,2423	4,71699	,2285	24,7931	25,6915	14,41	39,91		
	Without answer	84	26,5387	5,47267	,5971	25,3511	27,7264	16,31	43,58		
	Total	13830	26,1644	4,69954	,03996	26,0861	26,2427	13,29	50,2		

Chips and snack											
Is5-20		8414	26,5710	4,6	,0511	26,	26,67	13,29	5	50,263	,
	Ne			89		47	12		0,		0
	ver			42		08			2		0
									5		0
	1	3452	25,7967	4,6	,0787	25,	25,95	13,55	4		
	to			24		64	10		7,		
	2			57		24			2		
	tim								5		
	es										
	3	1435	24,9762	4,3	,1159	24,	25,20	16,11	4		
	to			92		74	37		5,		
	5			63		88			1		
	tim								2		
	es										
	6	431	25,0956	5,3	,2554	24,	25,59	14,41	4		
	to			03		59	77		7,		
	7			34		35			8		
	tim								4		
	es										
	Wi	98	26,3039	5,0	,5096	25,	27,31	17,18	4		
	tho			44		29	53		3,		
	ut			83		24			5		
	ans								8		
	we										
	r										
	Tot	1383	26,1644	4,6	,0399	26,	26,24	13,29	5		
	al	0		99		08	27		0,		
				54		61			2		
									5		
Pates, patella, burek											
Is5-21		7361	26,5659	4,8	,0560	26,	26,67	13,29	5	35,177	,
	Ne			11		45	58		0,		0
	ver			56		59			2		0
									5		0
	1	3858	25,9353	4,6	,0740	25,	26,08	13,63	4		
	to			00		79	05		7,		
	2			01		01			2		
	tim								9		
	es										
	3	2021	25,3202	4,3	,0960	25,	25,50	13,55	4		
	to			19		13	87		9,		
	5			44		18			9		
	tim								5		
	es										
	6	503	25,4649	4,6	,2072	25,	25,87	15,82	4		
	to			49		05	22		2,		
	7			10		77			6		
	tim								9		

es								
87	26,0101	4,5	,4905	25,	26,98	17,70	4	
Wi		75		03	52		3,	
tho		45		49			5	
ut							8	
ans								
we								
r								
Tot	1383	26,1644	4,6	,0399	26,	26,24	13,29	5
al	0		99		08	27		0,
			54		61			2
								5

Table 2
BMI compared to eating habits in the study population

Mark	Category	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Min	Max	F	Sig.
						Lower	Upper				
						Bound	Bound				
Breads											
6	Is White	797	25,94	4,6752	,052	25,84	26,04	13,5	48,6	9,34	,0
		3	40	2	36	14	66			9	00
	Semi white	272	26,49	4,7132	,090	26,31	26,66	13,2	50,2		
		4	20	6	31	49	91				
	Black, rye and similar types	190	26,58	4,7194	,108	26,37	26,79	15,5	47,2		
		5	23	9	13	02	43				
	Mixed media	116	26,20	4,6117	,135	25,93	26,46	15,7	49,6		
		6	44	6	06	94	94				
	I do not eat bread	50	26,35	6,8538	,969	24,40	28,30	17,4	48,5		
			49	9	29	70	28				
No answer	12	27,21	3,8663	1,11	24,76	29,67	20,0	34,5			
		87	6	612	22	53					
Total	138	26,16	4,6995	,039	26,08	26,24	13,2	50,2			
	30	44	4	96	61	27					
Type fatty spreads											
7	Is Mrgarin	501	26,27	4,7671	,067	26,14	26,40	13,2	50,2	17,0	,0
		1	68	1	34	48	88			2	00
	Butter	338	25,41	4,2388	,230	24,96	25,87	17,1	39,1		
			74	7	56	39	09				
	Mayonnaise	525	24,81	4,2130	,183	24,45	25,17	14,4	47,0		
			58	3	87	46	70				
	Fat	271	26,13	5,0491	,306	25,53	26,74	16,8	43,8		
			87	6	71	49	26				
	Sour cream	240	25,91	4,5283	,092	25,73	26,09	15,5	46,6		
		4	44	8	36	33	55				
Cheese											
Pasteta	165	25,70	4,6317	,113	25,47	25,92	15,8	48,6			
	5	00	6	85	67	33					
I do not use any spread	352	26,66	4,7332	,079	26,50	26,82	13,9	49,9			
	8	57	6	69	94	19					
No answer											
Без одгово	48	26,08	3,7081	,535	25,00	27,15	17,2	33,5			
		07	7	23	40	74					

pa											
Total		137	26,16	4,6902	,039	26,08	26,24	13,2	50,2		
		80	37	7	96	54	20				
<hr/>											
The oils in food preparation											
Is 8	Lard/bu	488	26,29	4,8097	,068	26,15	26,42	13,2	50,2	1,94	,0
	tter	9	26	9	79	77	74			4	84
	Vegetab	181	25,78	4,5721	,339	25,11	26,45	16,8	45,7		
	le oil		34	7	85	28	40				
	Margari	861	26,09	4,6369	,049	26,00	26,19	13,6	49,9		
	n	5	93	7	96	14	72				
	Oil	42	26,15	5,3576	,826	24,48	27,82	13,9	38,5		
			88	3	70	92	83				
Do not	74	25,67	4,2270	,491	24,69	26,65	16,2	43,5			
use		70	9	39	77	63	6	8			
grease											
No	29	27,52	4,8935	,908	25,66	29,38	20,0	36,8			
answer		75	7	71	61	89					
Total	138	26,16	4,6995	,039	26,08	26,24	13,2	50,2			
	30	44	4	96	61	27					
<hr/>											
Adding salt food											
Is 9	Never	583	26,39	4,8159	,063	26,27	26,51	13,9	49,9	9,56	,0
		1	59	1	07	22	95	5	5	4	00
	When	682	25,95	4,5921	,055	25,84	26,06	13,2	50,2		
	food is	4	50	4	59	60	40	9	5		
	not										
	salty										
	enough										
	Almost	115	26,24	4,6894	,137	25,97	26,51	16,1	46,3		
always	8	58	6	81	54	62	1	6			
pro care											
what											
the food											
taste											
No	17	25,28	3,9483	,957	23,25	27,31	19,5	36,0			
answer		51	9	63	50	52	8	1			
Total	138	26,16	4,6995	,039	26,08	26,24	13,2	50,2			
	30	44	4	96	61	27	9	5			
<hr/>											
Thinking about health when choosing food											
Is 1 0	Never	272	26,00	4,7028	,090	25,82	26,18	15,5	49,6	2,31	,0
		3	36	9	12	69	03	4	9	3	55
	Someto	560	26,15	4,7069	,062	26,03	26,28	13,2	50,2		
	mes	2	69	4	89	36	02	9	5		
	Often	311	26,24	4,7496	,085	26,08	26,41	14,4	48,5		
		5	76	9	10	07	44	1	7		
	Always	183	26,36	4,6409	,108	26,15	26,57	14,1	49,9		
		3	47	9	40	21	73	7	5		
No	557	25,90	4,4910	,190	25,52	26,27	13,9	43,3			
answer		16	5	29	78	54	5	9			
Total	138	26,16	4,6995	,039	26,08	26,24	13,2	50,2			

Table 3
The frequency of certain types of foods over the past week
Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	,090a	,008	,008	4,68053	,008	113,541	1	13828	,000
2	,103b	,011	,011	4,67474	,003	35,308	1	13827	,000
3	,114c	,013	,013	4,66941	,002	32,583	1	13826	,000
4	,120d	,014	,014	4,66620	,001	19,981	1	13825	,000
5	,125e	,016	,015	4,66327	,001	18,387	1	13824	,000
6	,129f	,017	,016	4,66110	,001	13,877	1	13823	,000
7	,132g	,017	,017	4,65956	,001	10,154	1	13822	,001
8	,134h	,018	,017	4,65836	,001	8,088	1	13821	,004
9	,136i	,018	,018	4,65767	,000	5,150	1	13820	,023

Predictors: 1 How often have you eaten during the last week or drink - Potato chips and other snacks, 2 How often have you eaten during the last week or drink - food bought in a bakery (pate, muffins, pies ...) 3 How often have you eaten during the last week or drink - chicken, 4 How often have you eaten during the last week or drink - Sweets (bonmbone, chocolate), 5 How often have you eaten during the last week or drink - Sir, 6 How often during the last week you eat or drink - sweet soft drinks (carbonated / non-carbonated soft drinks ...) 7 How often during the last week you eat or drink - Boiled potatoes, 8 How often have you eaten during the last week or drink - Sandwich, 9 How often have you eaten during the last week or drink - Meat products

Table 4
 BMI and bread, spreads, a type of fat in food preparation, immigration
 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	,042a	,002	,002	4,68636	,002	24,007	1	13778	,000
2	,051b	,003	,002	4,68453	,001	11,734	1	13777	,001
3	,056c	,003	,003	4,68336	,001	7,885	1	13776	,005
4	,059d	,003	,003	4,68285	,000	4,004	1	13775	,045

Predictors: 1 What type of bread you use most frequently in the diet ?, 2 Do dosoljavate food you eat ?, 3 What type of fat commonly use for cooking ?, 4 What type of fatty spreads usually smear on bread?

CONCLUSION

In the world and in our country is growing concern about the alarming global trend of increasing consumption of fast food and related metabolic disorders, overweight and obesity.

Results of research on the health status of the population in Serbia show that consumption of fast food negatively correlated with BMI, and that the most important factors determining BMI are nibbles, sweets and soft drinks, particularly among young people.

The social environment can affect the nutritional status of the population. Fast food as a trend of the modern way of life, is not necessarily synonymous with fatty, food with excess calories, poor quality food. Fast food can be a matter of particular importance for the tourism and catering offer and certainly leaves room for the creation of new nutritional concepts that can form a healthy eating habits. Physical activity of moderate intensity and controlled diet, can guarantee a healthy lifestyle and participate in the prevention of obesity.

LITERATURE

Bowman, SA. (2006). Television-viewing characteristics of adults: correlations to eating practices and overweight and health status. *Preventing Chronic Disease*, 3(2), 38.

Bahadoran, Z. Mirmiran, P. and Azizi, F. (2015). Fast Food Pattern and Cardiometabolic Disorders. A Review of Current Studies *Health Promot Perspect*, 5(4), 231–240.

Inagami, S. Cohen, DA. Brown. AF. Asch, SM. (2009). Body mass index, neighborhood fast food and restaurant concentration, and car ownership. *Journal of Urban Health*, 86(5), 683-95.

Jeffery, RW. Baxter, J. McGuire, M. Linde, J. (2006). Are fast food restaurants an environmental risk factor for obesity? *The international journal of behavioral nutrition and physical activity*, 3, 2.

Jiao, J. Moudon, A.V. Kim, S.Y. Hurvitz, P. M. and Drewnowski, A. (2015). Health Implications of Adults' Eating at and Living near Fast Food or Quick Service Restaurants. *Nutrition & Diabetes*, 5, e171.

Liebman, M. Pelican, S. Moore, S. A. Holmes, B- Wardlaw, M. K. Melcher, L. M. et al. (2003). Dietary intake, eating behavior, and physical activity-related determinants of high body mass index in rural communities in Wyoming, Montana, and Idaho. *International Journal of Obesity*, 27, 684–92.

Latetia, V. M. Ana, V. D. R. Jennifer, A. N. David, R. J. and Manuel, F. (2009). Fast-Food Consumption, Diet Quality, and Neighborhood Exposure to Fast Food. *J Epidemiol*, 170(1), 29–36.

Mehta, N. K. (2008). Weight status and restaurant availability a multilevel analysis. *American journal of preventive medicine*, 34(8), 127-133.

Mukesh, V. S., Singh, D. K. Yadav, R. K. Shukla, K. M. Sharma, I. K. Prajapati, N. C. (2014). A study of habit of fast food eating among school going adolescents and parental advice and its relation with their nutritional status. [Int J Res Med Sci., 2\(3\)](#), 892-896.

Nitin, J. Maria, N. Sharada, R. Raghavendra, B. Y. P. Tanima, G. and Manisha, S. (2015). Fast Food Consumption Pattern and Its Association with Overweight Among High School Boys in Mangalore City of Southern India. *J Clin Diagn Res.*, 9(5), LC13–LC17.

Rundle, A. Neckerman, K. M. Freeman, L. Lovasi, G. S. Purciel, M. et al. (2009). Neighborhood Food Environment and Walkability Predict Obesity in New York City. *Environ Health Perspect*, 117(3), 442–7.

Sokolova, L. Factors that determine body mass index in adult population of Serbia. (unpublished thesis)

Trushna, S. Geetanjali, P. Sandhya, P. N. Bhavita, P. Yash, R. (2014). Assessment of Obesity, Overweight and Its Association with the Fast Food Consumption in Medical Students. *J Clin Diagn Res*, 8(5), CC05–CC07.

Virtanen, M. Kivimäki, H. Ervasti, J. Oksanen, T. (2015). Pentti J, Kouvonen A, Halonen JI, Kivimäki M, Vahtera J. Fast-food outlets and grocery stores near school and adolescents' eating habits and overweight in Finland. *Eur J Public Health*, 25(4), 650-5.