

## IOP Conference Series: Earth and Environmental Science

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To cite this article: V orevi *et al* 2017 *IOP Conf. Ser.: Earth Environ. Sci.* **85** 012012

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# Dietary habits of Serbian preschool and schoolchildren with regard to food of animal origin

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**Abstract.** The goal of this study was to explore attitudes and habits of Serbian preschool and school children in consumption of meat products, milk and milk products, eggs and egg products and honey and bee products. The survey was conducted on a sample of 227 children, divided into three different age groups: preschool (ages 4-6), primary school I-IV grade (ages 7-11) and primary school V-VIII grade (ages 12-15). The results showed that all examined groups of children consumed meat products, milk and milk products, eggs and egg products, and honey and bee products. In all groups of children, the most frequently consumed food (among our food category choices) was dried ham (consumed by 19.64% of preschool children; 23.75% of schoolchildren from I-IV grade; 19.74% of schoolchildren from V-VIII grade). Fewer preschool children consumed sterilized milk compared to children of school age. The results showed that in all three groups of children, the most commonly consumed milk products were yoghurt (from 12.20 to 15.29% of children consumed these) and sour cream (from 11.57 to 12.74% of children consumed this), while kefir was the least-consumed product. In addition, there was no difference in consumption of boiled or fried eggs in the examined groups of children, while the consumption of egg products (mayonnaise) was higher in the group of preschool children than in the group of schoolchildren from V-VIII grade. Preschool children consumed honey 14.99% more often than schoolchildren from I-IV grade, and 14.49% more often than did schoolchildren from grade V-VIII.

## 1. Introduction

In the process of healthy physiological and psychological development of a person, the period of youth is very important. Children's eating habits are influenced by numerous social and individual factors. Improper eating behaviour in children and youths can cause numerous health complications that manifest themselves in adulthood [1]. The choice of food, its classification, and the methods of obtaining, storing and serving food is a cultural phenomenon [2]. Food preferences play a central role in food choices and consumption, and can be described as general predisposition for a particular food, expressed by degree of liking [3,11]. Food promotion has an effect on children's preferences, purchase behaviour and consumption of food categories, as well as consumption of specific brands within food categories [4].

Due to this complexity of eating behaviour, it is difficult to predict a child's eating behaviour patterns and preferences, or to precisely define the causes of a certain form of behaviour. Understanding the various factors that influence children's eating behaviour is the first step in forming



effective interventions intended to improve the eating habits of children and young people (adolescents) [5].

The purpose of this paper was to provide information about Serbian preschool and school children's most consumed foods among meat products, milk and milk products, eggs and egg products and honey and bee products.

## 2. Materials and Methods

The sample frame for this research consisted of 227 preschool children and primary schoolchildren, from one Belgrade municipality, who participated in the survey. Children were of three different age groups: preschool children (ages 4-6), primary schoolchildren I-IV grade (ages 7-11) and primary schoolchildren V-VIII grade (ages 12-15). Convenience sampling was used, and the questionnaire was distributed to all children who agreed to participate after they had been informed about the goals of the research. The questionnaire consisted of the following groups of questions on children's consumption habits for meat products, milk and milk products, egg and egg products and honey and bee products. The questionnaire was distributed among respondents, self-administrated, and was collected after three days.

### *Statistical analysis*

Statistical analysis of the results was performed using GraphPad Prism software version 6.00 for Windows (GraphPad Software, San Diego, CA, USA, www.graphpad.com). All data were expressed in percentages and the differences were tested by Chi-square test. Values of  $P < 0.05$  were considered statistically significant.

## 3. Results

Answers to the question, "Do you eat meat products, milk and milk products, eggs and egg products or honey and bee products?" (Table 1), showed that there was no difference between the different age groups of surveyed children, and that most of the children reported they ate meat products, milk, and milk products, eggs and egg products, and honey and honey products ( $P > 0.05$ ). All children of preschool age consumed milk and milk products (Table 1). Results related to consumption of honey showed that fewer older schoolchildren from V-VIII grade consumed honey than the younger groups (10.51% and 9.92% fewer, respectively, than preschool children and schoolchildren from I-IV grade).

**Table 1.** Results (% of yes answers/% of no answers) of different age groups of children in response to the survey question, "Do you eat meat products, milk and milk products, eggs and egg products or honey and bee products?"

| Group                        | Meat Products | Milk and dairy products | Eggs and egg products | Honey and bee products |
|------------------------------|---------------|-------------------------|-----------------------|------------------------|
| Preschool children           | 92.31/7.69    | 100.00/0.00             | 94.59/5.41            | 90.00/10.00            |
| Schoolchildren grade I-IV    | 95.92/4.08    | 94.51/5.49              | 92.54/7.46            | 89.41/10.59            |
| Schoolchildren grade IV-VIII | 93.67/6.33    | 97.40/2.60              | 93.06/6.94            | 79.49/20.51            |
| <i>P</i> -value              | 0.746         | 0.278                   | 0.922                 | 0.149                  |

The results in Table 2 showed that there was no difference between the tested groups of children in frequency of yes/no responses related to the consumption of different meat products, with the exception of other products (bacon, chicken breast and pancetta), where there was a significant difference between preschool children and schoolchildren ( $P < 0.05$ ). Among meat and meat products, the group of preschool children most frequently consumed dried ham (19.64% of all preschool

children ate this), and then in descending order, the following meats: cooked sausages-frankfurters, cured ham, Čajna fermented sausages, pate, smoked pork neck, Kulen, grilled sausages, other products and mortadella (1.19%). Altogether, 23.75% of schoolchildren from I-IV grade consumed dried ham, but fewer children consumed mortadella and other products (2.01% and 0.67%, respectively). Children of school age from V-VIII grade most frequently consumed dried ham and Čajna fermented sausages (19.74% and 15.46% of children consumed these products, respectively), and the least frequently, mortadella and other products (they were consumed by only 2.96% and 0.33% of these children, respectively).

**Table 2.** Consumption patterns (% of children reporting they consumed a food) among different age groups of children, distributed by the predominantly consumed meat products

| Meat products                             | Preschool children | School children I-IV grade | School children V-VIII grade | <i>P</i> -value |
|---|--------------------|----------------------------|------------------------------|-----------------|
| Cured ham                                 | 14.29              | 8.70                       | 8.55                         | 0.093           |
| Dried ham                                 | 19.64              | 23.75                      | 19.74                        | 0.409           |
| Fermented sausages-Čajna                  | 13.69              | 13.38                      | 15.46                        | 0.743           |
| Fermented sausages-Kulen                  | 5.36               | 7.36                       | 8.55                         | 0.446           |
| Smoked pork neck                          | 9.52               | 9.70                       | 9.21                         | 0.979           |
| Mortadella                                | 1.19               | 2.01                       | 2.96                         | 0.436           |
| Cooked sausages/frankfurters              | 15.48              | 14.38                      | 12.17                        | 0.559           |
| Pate                                      | 11.31              | 13.71                      | 13.82                        | 0.708           |
| Grilled sausage                           | 4.76               | 6.35                       | 9.21                         | 0.159           |
| Other (bacon, prosciutto, chicken breast) | 4.76 <sup>a</sup>  | 0.67 <sup>b</sup>          | 0.33 <sup>b</sup>            | 0.0002          |

<sup>a,b</sup> Within rows, numbers with different lower-case letters are significantly different ( $P < 0.05$ ).

The results in Table 3 show that fewer preschool children consumed sterilized milk compared to children of school age ( $P < 0.05$ ), while schoolchildren from V-VIII grade liked to consume kefir more than preschool and school children from I-IV grade. The results of all three surveyed groups of children showed that they most commonly consumed yogurt (from 12.20% to 15.29% of all children consumed this) and sour cream (from 11.57% to 12.74%) and least commonly drank kefir (1.27% to 3.36%).

**Table 3.** Consumption patterns (% of children reporting they consumed a food) among different age groups of children, distributed by predominantly consumed milk and dairy products

| Milk and dairy products | Preschool         | School children I-IV grade | School children V-VIII grade | <i>P</i> value |
|-------------------------|-------------------|----------------------------|------------------------------|----------------|
| Milk pasteurized        | 8.28              | 8.54                       | 8.02                         | 0.954          |
| Milk sterilized         | 1.59 <sup>a</sup> | 4.36 <sup>b</sup>          | 5.78 <sup>b</sup>            | 0.014          |
| Yogurt                  | 15.29             | 14.80                      | 12.50                        | 0.425          |
| Fruit flavoured yogurt  | 11.78             | 7.97                       | 9.89                         | 0.183          |
| Fermented milk          | 10.19             | 9.49                       | 7.65                         | 0.388          |
| Kefir                   | 1.27 <sup>a</sup> | 1.33 <sup>a</sup>          | 3.36 <sup>b</sup>            | 0.036          |
| Sour cream              | 12.74             | 12.71                      | 11.57                        | 0.816          |
| Raw cheese              | 8.92              | 9.68                       | 8.96                         | 0.900          |
| Caciocavallo            | 7.32              | 9.49                       | 10.45                        | 0.318          |

|              |      |      |      |       |
|--------------|------|------|------|-------|
| Cream cheese | 5.73 | 5.69 | 5.78 | 0.998 |
| Kaymak       | 6.05 | 5.69 | 5.41 | 0.926 |
| Butter       | 6.05 | 4.36 | 4.29 | 0.448 |
| Margarine    | 4.78 | 5.88 | 6.34 | 0.639 |

<sup>a,b</sup> Within rows, numbers with different lower-case letters are significantly different ( $P < 0.05$ ).

There was no difference in consumption of boiled and fried eggs in the examined groups of children, while the consumption of egg products (mayonnaise) was significantly more common in the group of preschool children compared to the schoolchildren group of V-VIII grade (Table 4).

**Table 4.** Consumption patterns (% of children reporting they consumed a food) among different age groups of children, distributed by predominantly consumed eggs and egg products

| Eggs and egg products | Preschool         | School children I-IV grade | School children V-VIII grade | <i>P</i> -value |
|-----------------------|-------------------|----------------------------|------------------------------|-----------------|
| Boiled eggs           | 46.58             | 43.84                      | 51.26                        | 0.489           |
| Fried eggs            | 43.84             | 52.38                      | 47.90                        | 0.495           |
| Egg products          | 9.59 <sup>a</sup> | 3.97 <sup>a,b</sup>        | 0.84 <sup>b</sup>            | 0.012           |

<sup>a,b</sup> Within rows, numbers with different lower-case letters are significantly different ( $P < 0.05$ ).

There was no difference between the tested groups of children in their consumption of honey, propolis and royal jelly. Altogether, 14.99% more preschool children consumed honey than did schoolchildren I-IV grade, and 14.49% more preschoolers consumed honey compared to children of grade V-VIII. In addition, the results showed that school-aged children were more likely consumers of propolis than preschool children ( $P > 0.05$ ).

**Table 5.** Consumption patterns (% of children reporting they consumed a food) among different age groups of children, distributed by predominantly consumed honey and bee products

| Honey and bee products | Preschool | School children I-IV grade | School children V-VIII grade | <i>P</i> -value |
|------------------------|-----------|----------------------------|------------------------------|-----------------|
| Honey                  | 63.93     | 48.94                      | 49.44                        | 0.135           |
| Propolis               | 19.67     | 36.17                      | 31.46                        | 0.089           |
| Royal jelly            | 16.39     | 14.89                      | 19.10                        | 0.745           |

**Table 6.** Eating frequency of food groups (%) reported by different age groups of children

| Food groups             | Possible answer        | Preschool           | School children I-IV grade | School children IV-VIII grade | <i>P</i> -value |
|-------------------------|------------------------|---------------------|----------------------------|-------------------------------|-----------------|
| Meat products           | Several times per day  | 10.00               | 10.59                      | 10.00                         | 0.990           |
|                         | Once per day           | 36.00               | 42.35                      | 55.00                         | 0.079           |
|                         | Several times per week | 18.00               | 9.41                       | 6.25                          | 0.094           |
|                         | Once per week          | 32.00               | 36.47                      | 26.25                         | 0.369           |
|                         | Once per month         | 4.00                | 1.18                       | 2.50                          | 0.570           |
| Milk and dairy products | Several times per day  | 4.17 <sup>a,b</sup> | 11.76 <sup>a</sup>         | 1.35 <sup>b</sup>             | 0.021           |

|       |                        |                      |                      |                    |         |
|-------|------------------------|----------------------|----------------------|--------------------|---------|
|       | Once per day           | 81.25 <sup>a,b</sup> | 69.41 <sup>a</sup>   | 91.89 <sup>b</sup> | 0.002   |
|       | Several times per week | 14.58 <sup>b</sup>   | 1.18 <sup>a</sup>    | 1.35 <sup>a</sup>  | 0.0004  |
|       | Once per week          | 0.00 <sup>a</sup>    | 14.12 <sup>b</sup>   | 5.41 <sup>a</sup>  | 0.009   |
|       | Once per month         | 0.00                 | 3.53                 | 0.00               | -       |
|       | Several times per day  | 2.33                 | 5.71                 | 7.25               | 0.536   |
|       | Once per day           | 18.60                | 32.86                | 34.78              | 0.160   |
| Eggs  | Several times per week | 34.88 <sup>a</sup>   | 4.29 <sup>b</sup>    | 7.25 <sup>b</sup>  | <0.0001 |
|       | Once per week          | 44.19                | 47.14                | 43.48              | 0.902   |
|       | Once per month         | 0.00                 | 10.00                | 7.25               | 0.111   |
|       | Several times per day  | 2.22                 | 5.33                 | 0.00               | 0.138   |
|       | Once per day           | 26.67                | 36.00                | 35.29              | 0.535   |
| Honey | Several times per week | 22.22 <sup>a</sup>   | 6.67 <sup>b</sup>    | 0.00 <sup>b</sup>  | <0.0001 |
|       | Once per week          | 40.00                | 30.67                | 32.35              | 0.559   |
|       | Once per month         | 8.89 <sup>a</sup>    | 21.33 <sup>a,b</sup> | 32.35 <sup>b</sup> | 0.013   |

<sup>a,b</sup> Within rows, numbers with different lower-case letters are significantly different ( $P < 0.05$ ).

The survey results show that meat and meat products and milk and dairy products are commonly consumed once a day (from 36% to 55% and from 91.89% to 69.41%, respectively) in all three examined age groups of children.

A greater percentage of preschool children compared with older children consumed eggs and honey several times per week ( $P < 0.05$ ), while schoolchildren from V-VIII grade were more likely than younger children to consume honey once per month.

#### 4. Discussion

This survey of dietary attitudes and habits of Serbian children aged 4-15 indicates that meat products featured once per day in their diets. According to Weichselbaum and Buttriss [6], the contribution of food group intakes in the diets of children aged 4-18 were: meat products 29% (aged 4-10) and 38% (aged 11-18); milk and milk products 21% (aged 4-10) and 14% (aged 11-18). In our research, the most frequently consumed meat, among the entire meat and meat products group, was dried ham. Djordjević et al. found that meat products such as dried ham, Čajna fermented sausages etc. have an acceptable taste and appearance for most children [10], as does mayonnaise which they used in preparing sandwiches. According to Baltic and Boskovic [8], meat has a significant role for maintenance of proper growth, development and health of children. Children and teenagers need to eat well and be active to get the nutrients they need for growth and to reach their full developmental potential without the problem of excessive weight gain [7].

Among the products in our research, milk is one of the most complete foods, providing the body with most of the nutrients growing children need. We found that all children of preschool age consumed milk and milk products. Foods in this group are also a good source of B vitamins, such as riboflavin, B12, vitamin A and protein. During growth in childhood and into teenage years, a good supply of calcium is needed to build healthy bones and teeth. At puberty, the onset of which can begin in children as young as 9 years of age, or can occur in children as old as 18, five servings of milk and

yoghurt daily is necessary to meet calcium needs [7]. Among Serbian children, yogurt is the most commonly consumed milk product because it is the most common milk product on the market that is sold in small, ready-to-use packages. Older children often consume kefir, because of the characteristic flavour, to which younger children are not accustomed. In addition, the higher consumption of pasteurized milk compared to sterilized milk among consumers in Serbia can be explained by its lower prices.

Our results related to consumption of honey showed that 10.51% fewer schoolchildren from V-VIII grade consumed honey than did preschool children and 9.92% fewer of the oldest children ate honey than did schoolchildren from I-IV grade. According to Karabasil et al. [9], nutritional and health aspects of the consumption of honey and bee products by children aged 4-15 is significant, because of its important influence of preservation of the immune system. The percentage of children who consumed eggs and egg products, and honey and bee products, was significantly different between preschool and school aged children from V-VIII grade (school aged children consume these foods less frequently). Eggs are a good source of energy and vital fats and minerals for breakfast, but should be limited to no more than seven per week [7].

In addition, we speculate that among children in Serbia, most food products are likely preferred consumer choices because of their sensory characteristics, such as mild taste and soft consistency (pancetta, Čajna sausages, frankfurter sausages, yoghurt and sour cream). An additional factor in favour of these products is their availability on the local market at mostly moderate prices.

## 5. Conclusion

In conclusion, children aged 4-15 years in Serbia are frequent consumers of foods of animal origin, which is necessary for their proper growth and development. It is very important that this trend continue, of course, as an integral part of a balanced diet, in spite of the negative image and context of meat and meat products in recent years. When it comes to preschool children, particular attention should be paid to parents' education, especially about the frequency with which their children consume foods of animal origin.

## Acknowledgments

This paper was supported by the Ministry of Education, Science and Technological Development, Republic of Serbia, through the funding of the Project No III 46009 and Project No 31034.

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