

# QUALITY OF MENUS IN SECONDARY SCHOOLS WITH REGARD TO RECOMMENDATIONS OF WORLD HEALTH ORGANIZATION (WHO)

## KAKOVOST JEDILNIKOV V SREDNJIH ŠOLAH GLEDE NA PRIPOROČILA SVETOVNE ZDRAVSTVENE ORGANIZACIJE (SZO)

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### Abstract

**Background:** Meals provided at school constitute an important part of the students' daily diet. The World Health Organisation (WHO) has issued nutrition recommendations for children and adolescents aged 7 to 18 years. The aim of this study was to test the hypothesis that the quality of meals served in Slovene secondary schools does not meet the criteria recommended by WHO.

**Methods:** In 2003, a survey on the quality of school meals, based on food diaries kept during one week, was conducted by the Ministry of Education, Science and Sports in all Slovene secondary schools. Fifty-eight menus (230 meals) served in eight (5.6 %) Slovene secondary schools were analysed. A computer programme devised for evaluating the patient catering service in the University Medical Center Ljubljana was used in the survey.

**Results:** Energy and nutritional values (carbohydrate, protein and fat content) were calculated for each mid-morning school meal. Energy requirements recommended by WHO for boys and for girls were met by only 10.3 % and 13.8 % of the one-week menus analysed. The proportion of meals providing the recommended dietary carbohydrate intake was 6.9% for boys and 17.3% for girls. The most striking finding was that none of the mid-morning meals complied with the WHO recommendations for dietary protein intake. Only 1.7% and 3.5 % of school meals, respectively, were found to provide adequate fat content recommended for boys and girls.

**Conclusion:** Our hypothesis has been fully confirmed given that mid-morning meals are considered to provide 30 % of the estimated average energy and nutritional values. School meals provided in Slovene secondary schools do not meet the WHO criteria for energy and nutritional values. Strategies to improve the quality of school food should aim to balance energy intake and energy expenditure through physical activity, to increase carbohydrate intake and cut down on protein. Also, schools should employ professionals in school nutrition to manage school food services.

**Key words:** secondary school pupils, organization of school nutrition service, meals, energy value, nutritional value

Izvorni znanstveni članek  
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### Izvleček

**Izhodišča:** Šolska prehrana oz. obrok v času pouka je pomemben del celodnevne prehrane dijakov. Svetovna zdravstvena organizacija (SZO) je izdala prehranska priporočila za otroke in mladostnike, stare od 7 do 18 let. Na

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podlagi teh priporočil smo postavili raziskovalno hipotezo: *Kakovost jedilnikov v srednjih šolah ne ustreza priporočilom SZO oz. WHO.*

**Metode:** Ministrstvo za šolstvo, znanost in šport (MŠZŠ) je junija 2003 na vse slovenske srednje šole poslalo anketo o organiziranosti prehrane v srednjih šolah. V obdelavo smo dobili tedenske jedilnike. Prejeti jedilniki (N=36) so bili pregledani in za vsako šolo je bil pripravljen dopis in preglednica, v katero je bilo potrebno dopisati živila, ki sestavljajo posamezne jedi na jedilniku, proizvajalca posameznih živil in količino živila v jedi oziroma obroku. Šole smo zaprosili, da preglednice izpolnijo in vrnejo. Na koncu smo analizirali 58 jedilnikov (230 malic) 8 (5,6 %) srednjih šol v Sloveniji. Jedilnike smo analizirali z računalniškim programom Priprava hrane za bolnike v Kliničnem centru v Ljubljani.

**Rezultati:** Vsaki malici smo določili energijsko in hranilno vrednost (vsebnost ogljikovih hidratov, maščob in beljakovin). Dobljene povprečne vrednosti tedenskih jedilnikov smo primerjali s priporočili SZO. Ugotovili smo, da imajo šole energijsko in hranilno zelo različne malice. Energijskim priporočilom SZO za fante ustreza samo 10,3 % povprečnih tedenskih jedilnikov, za dekleta pa 13,8 % jedilnikov. Delež malic, ki ustrezajo priporočilom potreb po ogljikovih hidratih, je pri fantih 6,9 % in dekletih 17,3 %. Najbolj presenetljiv in zaskrbljujoč podatek je, da med analiziranimi malicami niti ena ne ustreza priporočilom SZO za beljakovine. Pri priporočenih vrednostih za maščobe priporočilom ustreza 1,7 % malic za fante in 3,5 % malic za dekleta.

**Zaključki:** Raziskovalno hipotezo, da kakovost jedilnikov v srednjih šolah ne ustreza priporočilom SZO oz. WHO, lahko popolnoma potrdimo. V primeru, ko analizirano malico, to upoštevamo kot šolski obrok, ki po priporočilih pokrije 30 % dnevnega energijskega vnosa. V tem primeru jedilniki na slovenskih srednjih šolah niti po energijskih vrednostih niti količini hranil ne ustrezajo priporočilom SZO. Cilji za izboljšanje šolske prehrane in njeno vzdrževanje med mladostniki so uravnesiti energijski vnos in telesno dejavnost, povečati vnos ogljikovih hidratov, zmanjšati vnos beljakovin in ne nazadnje zapolniti strokovno usposobljene vodje prehrane.

**Ključne besede:** srednješolci, organizacija šolske prehrane, obroki, energijska vrednost, prehranska vrednost

## Introduction

The term »school nutrition service« refers to organised provision of mid-morning meals, and exceptionally of other daily meals, for pupils attending secondary schools (1). Regular and healthy eating during adolescence is very important and plays a crucial role in the young person's physical, mental and social well-being. Economically speaking, quality school food has an immediate social impact, but also represents a necessary long-term investment. Ensuring that young people eat healthy food is one of the main factors leading to one of the most treasured goals – good health of the individual and society (2).

WHO states that adolescents who had adopted healthy dietary habits in their youth are more likely to maintain them in adult life. This means there is less chance they will develop chronic disorders, heart disease, cancer, diabetes and osteoporosis (3). WHO therefore decided to endorse European recommendations for healthy nutrition of children and adolescents aged 7 to 18 years (4). The table below indicates energy and nutritional requirements of pupils to be met by school meals.

Adolescents need a greater amount of quality food than primary school pupils. For normal activity they require normal blood sugar levels, which can only be ensured by a mid-morning school meal. Their productivity and motivation decrease after approximately four hours of work, or after four hours elapsed after the last meal (5). School meals must therefore be designed to fully meet the adolescent's energy and nutrient requirements. In Slovenia 22.1 % of schools have a central kitchen, 5.6 % have only a meal distribution kitchen, 50 % have a refreshment room and 20 % have no food service facility (6). As many as half of schools, i.e. those with refreshment rooms, are therefore not equipped for preparing technologically and nutritionally adequate meals on site. The hypothesis we wanted to test in the study is that the quality of secondary school meals fails to meet the criteria recommended by the WHO.

## Methods

In June 2003, the Ministry of Education, Science and Sports launched a survey investigating the organisation of school food services in Slovenia. All secondary schools in the country were asked to answer 25 sur-

Table 1. Summary of nutritional guidelines for school meals (4).

Tabela 1. Povzetek smernic šolske prehrane (4).

Nutrient / Hranilo	Recommendations for school meal / Priporočila za šolsko prehrano	Age 15-18 year / Starost 15-18 let	
		Boys / Dečki	Girls / Deklice
Energy / Energija	30 % Estimated Average Requirement (EAR) / 30 % dnevne energijske potrebe	3450 kJ (825 kcal)	2635 kJ (630 kcal)
Proteins / Beljakovine	> 30 % Recommended Nutrient Intake (RNI) / > 30 % priporočen hranilni vnos	> 14.5 g	> 15.4 g
Carbohydrates / Oglj.hidrati	> 50 % of food energy / > 50 % dnevnih energijskih potreb	> 103.1 g	> 78.7 g
Fats / Maščobe	< 35 % of food energy / < 35 % dnevnih energijskih potreb	< 32 g	< 24.5 g

Note: Energy in kJ (cal.) and the amount of nutrients in grams are calculated for 11500 kJ and 8780 kJ of daily energy requirements in boys and girls, respectively.

Calculations were done by the authors

RNI - recommended nutrient intake

EAR - estimated average requirement

vey questions and to record their mid-morning meal menus for the following periods:

- 1st week: 7 – 11 October 2002
- 2nd week: 14 – 18 October 2002
- 3rd week: 6 – 10 January 2003
- 4th week: 13 – 17 January 2003
- 5th week: 7 – 11 April 2003
- 6th week: 14 – 18 April 2003

We received and checked menus from 36 (25.3 %) of 142 secondary schools and school centers. The respondents were sent a letter asking them to complete a table specifying which foodstuffs were used in each particular dish, and to give their amount and the producer's name. The schools were asked to return completed tables to our address. We received completed tables from only eight (5.6 %) schools. We analysed 58 menus served over one week, i.e. a total of 230 mid-morning meals, using the University Medical Centre Ljubljana computer programme for patient catering

service evaluation, which is part of the WINPIS business information system.

## Results

There are considerable inter-and intra-school differences concerning the mid-morning meals offered. The participating schools were therefore divided into three groups:

- Schools providing only one cold mid-morning meal (six schools).
- Schools providing a choice of three mid-morning meals, two cold and one cooked menu (one school).
- Schools offering a cooked mid-morning meal (one school).

The average energy and nutritional values of mid-morning meals served in the schools over a week were compared with those recommended by WHO. A mid-morn-

ing meal with an energy value within  $\pm 5\%$  of the energy requirements recommended for secondary school students (132 kJ i.e. 31.5 cal for girls and 171 kJ i.e. 41 cal for boys), was considered to provide adequate energy intake (Table 1). School meals with carbohydrate and protein content that was 5% higher than the lower limit of the recommended value were considered nutritionally suitable for secondary school students (Table 1), and so were the mid-morning snacks containing 5% less fat than the upper recommended value of this nutrient (Table 1).

Average energy values of mid-morning meals served over a week differed largely from one school to another. Energy value of the meals surveyed ranged from 685.9 kJ (164 cal) to 4,131.2 kJ (988.3 cal). We found that three mid-morning meals provided by the same school had very different energy and nutritional levels, the highest energy value being 4,011.7 kJ (960 cal) and the lowest 685.9 kJ (164 cal).

Our analysis of 58 one-week mid-morning meal menus showed the following:

- boys: 12.1% of mid-morning menus exceeded the recommended energy level, 77.6% were below the recommended energy value and 10.3% were meeting the recommended energy levels.
- girls: 41.4% of the mid-morning menus analysed provided more energy than recommended, 44.8% supplied less energy than recommended and 13.8% were meeting the recommended values.

The analysis of mid-morning meals served over a week showed that the meals did not meet standards for school meals set in the WHO guidelines. As many as 86.2% of boys and 89.7% of girls eat school meals that **are either too abundant or too frugal**, too large or too small, too calorie rich or too calorie low;

Carbohydrate content in an average mid-morning meal ranged from 32 g to 134.1 g (Table 1). We found that 75.9% of one week's menus failed to meet the recommended carbohydrate requirements for boys, and that only 6.9% complied with the WHO recommendations. The proportion of meals with adequate carbohydrate content for girls was slightly higher (17.2%), yet half of one-week menus contained more carbohydrates than the recommended value.

Average school meals contained 6.7 g to 45.7 g of proteins (Table 1). Figure 2 indicates that the protein content recommended for boys and girls was too high in 87.9% of one-week menus and too low in 12.1%, which means that 0% of meals served over one week met the recommended protein requirements.

The amount of fat in average school meals ranged between 0.3 g and 57.8 g (Table 1). The fat content recommended for boys and girls was too low in 79.3% and in 55.2% of one week's menus, respectively. It should be pointed out that 41.2% of one-week menus contained more fat than the recommended amount of fat for girls.

### Compliance of energy value of school meals with energy levels recommended by WHO

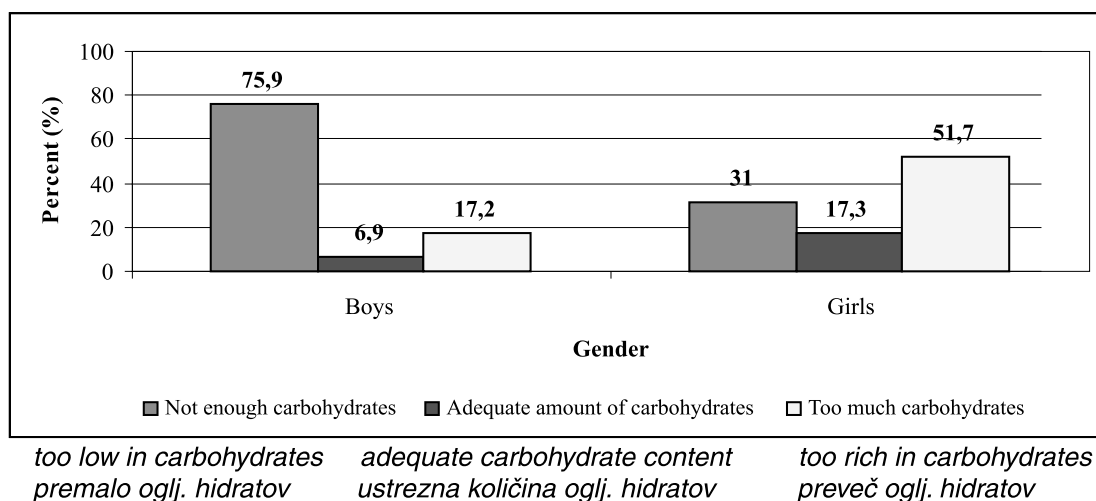


Figure 1. The proportion of one-week mid-morning meal menus with carbohydrate content meeting/not meeting carbohydrate requirements recommended by WHO.

Slika 1. Odstotek tedenskih jedilnikov dopoldanskih šolskih malic z ustrezno/neustrezno vsebnostjo oglj. hidratov glede na smernice SZO.

### Compliance of school meals with the WHO recommendations relating to protein content

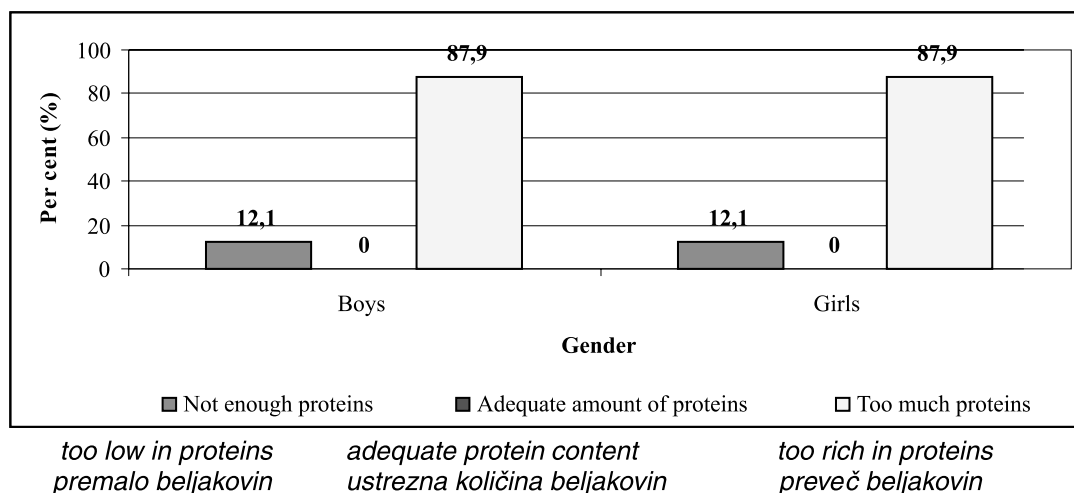


Figure 2. The proportion of one-week school menus meeting/ not meeting protein requirements recommended by WHO.

Slika 2. Odstotek tedenskih jedilnikov dopoldanskih malic z ustrezno/ neustrezno vsebnostjo beljakovin glede na priporočila SZO.

### Compliance of school meals with the WHO recommendations relating to fat content

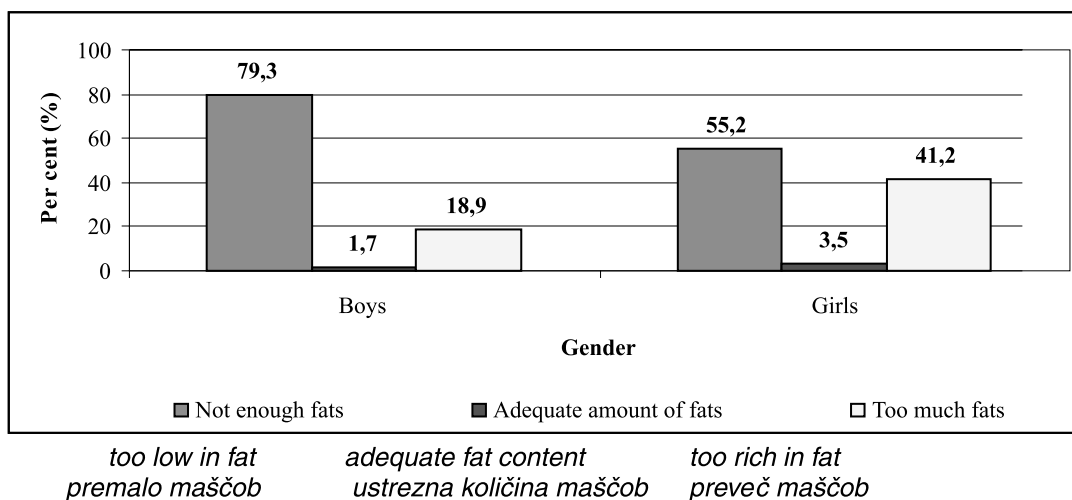


Figure 3. The proportion of one week's menus meeting/not meeting fat requirements recommended by WHO.

Slika 3. Odstotek tedenskih jedilnikov dopoldanskih malic z ustrezno/neustrezno vsebnostjo maščob glede na priporočila SZO.

## Discussion

Nutritional requirements vary with age. Proper nutrition is much more important in the young than in adults. Even a short period of inadequate dietary intake of essential nutrients and/or energy may lead to delay in growth and development, as well as to poor health, tiredness and lowered resistance to infection. Intense

growth and development, as well as increased physical strain due to participation in sports, increase energy and nutritional requirements in children, as well as their need for essential nutrients (7). The main goal of nutrition planning for children should therefore be to offer balanced, safe and protective meals meeting energy and nutritional demands that vary depending on gender, age, weight, height, physical activity and nutri-

tional status. Our study showed significant differences between the school meals served (e.g. energy values ranged from 685,9 kJ to 4,131.2 kJ). Energy and nutritional values of all mid-morning meals should comply with current WHO dietary recommendations. Energy and nutrient requirements of every pupil should be adequately met, irrespective of which mid-morning meal he/she chooses. The main problem encountered was that three fourths of school meals failed to meet the energy reference values for boys, and that the menus served either failed to meet or exceeded energy values recommended for girls.

Carbohydrates are primary nutrients supplying energy (8). They are very important in the diet because they slowly increase glucose in blood and thereby impact the pupils' performance at school (8). We found that 75.9 % of menus failed to meet carbohydrate requirements for boys. For girls, who need less dietary carbohydrates, 51.7 % of the menus were too rich in carbohydrates.

The need for protein increases during adolescence because of increasing lean body mass, red cell mass and myoglobin, and due to hormonal changes. It is therefore of primary importance for pupils to get enough proteins. Their protein intake, however, should not exceed the recommended value because immoderate protein intake is connected with high intake of fats (8). Eating food rich in proteins, phytanic and oxalic acids, phosphates and fibrins, and consuming alcoholic beverages, caffeine and some medicines hinders absorption of dietary calcium from the intestine (9). The amount of proteins supplied by the food analysed failed to meet protein requirements recommended by WHO. As many as 87.9 % of the menus analysed were too rich in proteins, which is likely to result in ill health and increase the risk of osteoporosis in later life.

Adolescents have increased need for energy to support physical growth and development. Yet, to avoid the risk of cardiovascular disease, diabetes type II and obesity in this population group, the amount of fat in adolescents' diet must not exceed the recommended requirements. We expected that the recommended fat content would be exceeded in most menus, but the exact opposite was true: the one-week menus analysed supplied inadequate amounts of fats. School meals should provide 32 g of fat for boys and 24.5 g of fats for girls, but the amount of fat was inadequate for boys in 79.3% of the menus and for girls in 55.2 % of the menus analysed. Schools urgently need clear guidelines and nutrition standards to be able to plan healthy mid-morning meals that would meet the recommended energy and nutritional requirements. In addition, schools should employ nutritional professionals to manage school food service, and

make arrangements for the cooking personnel to attend courses on healthy nutrition on a yearly basis.

## Conclusions

The results of the survey of one-week school menus have confirmed our hypothesis that the quality of food served in Slovene secondary schools does not comply with the WHO recommendations. School meals were found to be either too calorie rich or too calorie low for 86.2 % of boys and for 89.7 % of girls. Meals provided by secondary schools need to be improved to supply more carbohydrates and fats and less protein. Schools should provide for balance between dietary energy intake and energy expenditure through physical activity, and employ a school foodservice professional. Moreover, all secondary schools in Slovenia should use standardised recipes to ensure that their menus meet specific standards of healthy school nutrition. A clear set of rules and instructions regulating the work of school kitchen personnel should be adopted. Caterers delivering food to secondary schools should be selected according to strict criteria.

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Legend:

g - gram

kJ – kilo Joule

MŠZŠ - Ministry of Education, Science and Sports

WINPIS - business information system

WHO – World Health Organisation