

# ПРОФИЛАКТИЧЕСКАЯ МЕДИЦИНА

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## PREVENTIVE MEDICINE

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### HYGIENIC ASSESSMENT OF ACTUAL DIETING OF THE KHAKAS REPUBLIC ADULT RESIDENTS WITH LOW ENERGY EXPENDITURE<sup>1</sup>

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*The paper presents statistical data on foods consumption by the residents of the Khakas Republic. It also contains an analysis of actual dieting of the adult population with low energy expenditure in terms of dietary adequacy indications. A number of suggestions aimed at dieting optimization are made.*

**Keywords:** *foods; energy content; nutrients; vitamins; minerals; dieting.*

### ГИГИЕНИЧЕСКАЯ ОЦЕНКА ПИТАНИЯ ВЗРОСЛОГО НАСЕЛЕНИЯ РЕСПУБЛИКИ ХАКАСИЯ С НИЗКИМИ ЭНЕРГОТРАТАМИ

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*В статье отражены статистические данные о потреблении пищевых продуктов населением Республики Хакасия. Приведен анализ фактического питания взрослого населения с низкими энергозатратами по показателям пищевой адекватности. Изложены предложения по оптимизации питания.*

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<sup>1</sup> Кондрашова Е.А. Гигиеническая оценка питания взрослого населения Республики Хакасия с низкими энергозатратами // В мире научных открытий, 2016. № 3(75). С. 10-19. doi:10.12731/wsd-2016-3-1.

*Ключевые слова:* продукты питания; калорийность; питательные вещества; витамины; минеральные вещества; рацион питания.

Dieting is considered to be one of the fundamental factors that should be taken into account for the aims of health maintenance and promotion of the employable age population. According to calculations carried out by economists, doctors as well as nutritionists the daily consumption rate per person in Russia is on average 2200 kcal (in 1990–2590 kcal). Based on the FAO (Food and Agriculture Organization) international classification [7], the dieting energy consumption of 2200 calories is thought to be insufficient and is considered to be an indicator of long-term malnutrition. It should be noted that the last few decades are characterized by a decrease in physical activity of the population of the Russian Federation, which in turn leads to a decrease in energy expenditure. This reduces not only the amount of food consumed, but also the intake of essential nutrients [8, pp. 10–24; 9, pp. 5–8, 11]. Therefore, today the priority should be given to dieting studies of people with low energy expenditure.

The aim of the study: to analyse and assess actual dieting of adult residents of the Khakas republic with low energy expenditure along with working out dieting optimization suggestions.

The object of the study: 400 people of employable age engaged mainly in intellectual labour. The criterion being their profession, all the respondents were divided into 2 groups according to the physical activity coefficient (PAC) up to 1.6 and exceeding 1.6.

Methods of the study: the data on actual dieting were obtained using questionnaires and survey procedures. The hygienic assessment of the respondents' actual dieting was carried out using the method of the daily 24-hour reconstruction in accordance with the guidance notes on the study of actual dieting and health status in relation to the dieting habits as well as the 'The tables of the Russian food products chemical composition' reference book [3, pp. 4–23; 6, pp. 6–274]. The diets were assessed in terms of their quantity and quality, taking into account the energy value and structure (the number of calories replenished at the expense of proteins, fats and carbohydrates), chemical composition, including the amount of food (proteins, fats, carbohydrates) and biologically active substances (vitamins A, B1, C, E, minerals Ca, Mg, P, Fe) [4, pp. 12–44; 10, pp. 11–22].

The findings were then compared to the standards 2.3.1.2432-08 'The physiologic needs for energy and nutrients standards for different groups of the population' [1, pp. 2–4]. The study results were processed using the nonparametric

statistics method along with Microsoft Office Excel 2007 software by calculating the median and interquartile range (Me,  $Q_{25}$ - $Q_{75}$ ). The differences obtained were considered statistically relevant at the level of significance equal to  $p \leq 0.05$ .

### The results of the study

The data provided by the local agency of the Federal State Statistics Service for the Khakas Republic over the period of 2010–2014 show the residents' reduced consumption of biologically valuable foods (meat and meat products, dairy products, fruit and vegetables), the result being the insufficient intake of complete proteins, polyunsaturated fatty acids, micronutrients and vitamins that might tell on public health due to unbalanced dieting [2, pp. 27–28, 5].

According to the data shown in Table 1, the average per capita consumption of meat and meat products over the period of 2010–2014 in the Khakas Republic remains at a low level compared with the physiological dieting standards (on average 69.4 kg [5]).

Over the above-mentioned period consumption of dairy products increased from 250 kg/year in 2010 to 260 kg/year in 2014, that amounted to 81.3% of the required consumption standards.

There is also a shortage of the per capita consumption of vegetable produce. However, it should be noted that in general consumption of vegetables increased from 109 kg/year in 2010 to 118 kg/year in 2014 and amounted to 98.3% of the required consumption standards.

Table 1.

#### Actual consumption of basic food groups by the residents of the Khakas Republic in 2010–2014 compared to the required consumption standards

No	Foods group	2010, kg/pers. a year	2011, kg/pers. a year	2012, kg/pers. a year	2013, kg/pers. a year	2014, kg/pers. a year	The required consumption standards kg/ pers. a year
1.	Bakery products in terms of flour, flour, cereals, legumes	134	134	135	130	128	95-105
2.	Potatoes	119	119	119	115	115	95-100
3.	Vegetables and gourds	109	110	117	117	118	120-140

*End of the Table 1.*

4.	Fruit and berries	39	40	45	47	46	90-100
5.	Meat and meat products (total)	66	68	72	73	68	70-75
6.	Milk and dairy products (total)	250	263	267	266	260	320-340
7.	Fish and fish products	14.5	15.2	16.5	-	-	18-22
8.	Sugar	30	31	32	32	32	24-28
9	Vegetable oil	10.3	10.5	11.3	11.2	11.2	10-12
10	Eggs	251 pc	260 pc	265 pc	255 pc	250 pc	260 pc

According to the data obtained from the questionnaires and survey there is insufficient consumption of basic food products in comparison with the relevant data from the Siberian Federal District and the Russian Federation (Table 2).

*Table 2.*

**Actual consumption of basic food groups by the residents of the Khakas Republic according to the data obtained from the questionnaires**

No	Foods group	Actual consumption kg/pers. a day		Required consumption standards, kg/pers. a day	Divergence, %		Consumption according to the statistical data in 2014, kg/pers. a day	
		PAC <1.6	PAC >1.6		PAC <1.6	PAC >1.6	SFD	RF
1.	Bakery products in terms of flour, flour, cereals, legumes	0.23	0.29	0.27	85.2	107	0.34	0.32
2.	Potatoes	0.29	0.32	0.27	107	118	0.36	0.3
3.	Vegetables and gourds	0.18	0.21	0.35	51.4	60	0.27	0.3
4.	Fruit and berries	0.12	0.1	0.26	46.2	38.5	0.13	0.17

End of the Table 2.

5.	Meat and meat products (total)	0.102	0.135	0.2	51	67.5	0.2	0.2
6.	Milk and dairy products (total)	0.44	0.56	0.9	48.8	62.2	0.7	0.66
7.	Fish and fish products	0.041	0.049	0.054	75.9	90.7	-	-
8.	Sugar	0.074	0.070	0.071	104.2	98.6	0.09	0.1
9	Vegetable oil	0.029	0.031	0.03	96.6	103	0.03	0.037
10	Eggs	0.25	0.21	1 pc	25	21	0.71	0.73

The average actual energy value of diets intended for men with PAC<1.6 amounts to 1934.80 kcal ( $Q_{25}$ - $Q_{75}$ 1451.00-2321.80), with PAC>1.6 - 2253.12 kcal ( $Q_{25}$ - $Q_{75}$ 1913.78-3060.89), which is less compared with the established daily energy needs standards of 2100-2800 kcal (for men with PAC<1.6) and 2950-3300 kcal (for men with PAC>1.6). It is also correct for women who have shown a reduced energy value of their daily diet that amounts to 1595.05 kcal ( $Q_{25}$ - $Q_{75}$ 1327.60-1825.09) and 1608.70 kcal ( $Q_{25}$ - $Q_{75}$ 1248.23-1769.85) for women with PAC<1.6 and PAC>1.6 respectively. The differences are statistically relevant ( $p \leq 0,05$ ).

The ratio of proteins, fats and carbohydrates in the diet of men with PAC<1.6 amounts to 1:1.04:3.1, with PAC>1.6 - 1:1:3.7, of women with PAC<1.6 - 1:1.1:3.9, of women with PAC>1.6 - 1:1:3.4.

The content of calcium, phosphorus and magnesium in the daily diet of men with PAC<1.6 amounts to 1:1.8:0.5, of men with PAC>1.6 - 1:1.6:0.6. Women with PAC<1.6 showed the following ratio of calcium, phosphorus and magnesium - 1:1.4:0.5, with PAC>1.6 - 1:1.5:0.4.

This ratio fails to comply with the physiologically required ratio (1:1.5:0.5), which might negatively affect the absorption of these minerals.

The average vitamins content in the daily diet of men is shown in Table 3.

Table 3.

**Vitamins content in the daily diet of men according to the data obtained from the questionnaires**

Vitamins	Standard need	Actual content:			
		PAC<1.6		PAC>1.6	
		Average value	Divergence	Average value	Divergence
A, mkg (ret. eq.)	900	580	-35.5%	1120	+24%

*End of the Table 3.*

C, mg	90	45.4	-49.5%	65.2	-27.5%
B <sub>1</sub> , mg	1.5	0.69	-46%	0.96	-36%
E, mg (toc. eq.)	15	12.2	-18.6%	15	-

The analysis of men's daily rations vitamin content found out that those with PAC>1.6 had a higher vitamins consumption rate, being relevant from the statistics point of view, compared with those with PAC<1.6. ( $p \leq 0.05$ ).

*Table 4.*

**Vitamins content in the daily diet of women according to the data obtained from the questionnaires**

Vitamins	Standard need	Actual content:			
		PAC<1.6		PAC>1.6	
		Average value	Divergence	Average value	Divergence
A, mkg (ret. eq.)	900	590	-34.4%	510	-43.3%
C, mg	90	64	-28.8%	45.3	-49.6%
B <sub>1</sub> , mg	1.5	0.63	-42%	0.64	-57.3%
E, mg (toc. eq.)	15	10.2	-32%	11.4	-24%

According to the data obtained, women's diet vitamin composition fails to comply with the physiologically required ratio.

### Conclusion

Actual dieting of the adult population with low energy expenditure in the Khakas republic is characterized as being unbalanced in terms of foods themselves, energy adequacy ratio as well as nutrients.

The survey revealed the reduced energy value of the residents' daily ration. The actual ratio of proteins, fats, carbohydrates and minerals is thought to be unbalanced.

To maintain and promote health as well as reduce the risk of alimentary-dependent diseases development a number of measures should be taken aimed at optimizing dieting of the residents with low energy expenditure. The complex of measures that should be implemented with the participation of the government of the republic, as well as health authorities and the Federal Service on Surveillance for Consumer Rights Protection and Human Welfare is as follows:

- in order to handle the issue of micronutrient deficiency fortification of mass consumption foods, especially bread and bakery products, should

be one of the trends of the Khakas Republic regional policy in the sphere of healthy dieting;

- medical staff (especially GPs) should be more aware of alimentary risks leading to the development of diseases and their complications, as well as the link between health indicators and actual dieting, of using food supplements as an additional source of micronutrients;
- residents with low energy expenditure should be more aware of dieting issues including the ones related to age and occupation, ration energy value and chemical composition.

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