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Actual Nutrition of Indigenous Peoples of the North in Today's Socio-Economic Development of the Arctic [On the Example of the Evenk District Olenok the Republic of Sakha (Yakutia)]

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Abstract: The aim of this study was to evaluate the impact of some demographic and socio-economic factors on the formation of dietary habits of the population of village Gilindi in Oleneksky region of the Republic of Sakha (Yakutia) to the development of the Tomtor Deposit of rare earth metals. Due to the massive extraction of minerals, the migration routes of deer and the condition of the forage base of deer have changed and that became one of the reasons for a substantial reduction in the deer population. These factors led to a significant change in the nature of the power of the Evenks. The results of the study indicate a significant reduction in the consumption of reindeer meat is a basic food product and substitute this deficit with carbohydrate food, in particular bread and pasta.

Key words: Food, Evenks, quality of life, health, indigenous peoples of the North, carbohydrate metabolism, lipid metabolism, adaptation

INTRODUCTION

The fundamental basis for the formation of human health is nutrition. The indigenous peoples of the North formed a protein-lipid exchange type of metabolism according to the nature of food in the form of reindeer meat and fish products (Panin, 2013; William, 2014; William *et al.*, 2005). One of the main condition of safe human life in extreme conditions is high-quality food which compensates a negative impact of climate on an organism, therefore at the Northern peoples a great attention has long been given for a good, healthy food (Krivoschapkin, 2001). Indigenous peoples of the North survived in the conditions when the frost penetrates in the winter and in summer the heat is exhausting and managed to organize the main factor in the existence-food supply, is of course, a phenomenon peculiar (Wlosinski and Panin, 2014; Manchuk and Nadtochiy, 2010).

The food of Northern people is very nutritious, provides energy and is absolutely healthy, delicious and nutritious. And so they're still adheres to traditional nutrition, passing from generation to generation, enriching and perfecting the recipes of dishes and drinks of national cuisine (Krivoschapkin, 2001).

According to Krivoschapkin and co-authors, venison is readily absorbed from the gastrointestinal tract and contains high amount of polyunsaturated fatty acids and is a hypoallergenic product (Krivoschapkin, 2001).

According to the sanitary-epidemiological surveillance (in 2012), the majority of the population of the Republic of Sakha (Yakutia) revealed a malnutrition, deficiency of

vitamins, micro-and macroelements and complete proteins. The consumption of meat and meat products in terms of meat is 81.9% of the physiological norm, fresh fish and fish products-38.9%, dairy products-62.9%, eggs-68.9%. These figures, due to the economic situation of the Republic, the difficulties associated with the importation of food in the Arctic regions. The consumption of sugar and confectionery in terms of sugar is 492.3%, bread-145.9%. As a result of unbalanced diet of population with a deficit in the diet of essential nutrients-proteins, vitamins, trace elements, there is a direct link with the trend of growth of alimentary-dependent morbidity-anemia, obesity, pathologies of the endocrine system, digestive system, eating disorders and metabolic disorders. According to statistics in the Republic of Sakha (Yakutia) from 2000 to 2012, the number of people suffering from alimentary-dependent diseases has increased more than 1.5-3 times (Krivoschapkin, 2001).

In the North, the need for carbohydrates reduces and increases the need for protein and fat. The decrease in the intensity of carbohydrate metabolism reduces the body's need for several water-soluble vitamins-B1, B2. Simultaneous enhancement of fat metabolism increases the need for fat vitamins-A, D, E, playing the role of antioxidants in relation to saturated fatty acids (Nozdrtachev *et al.*, 2001; Katzenberg *et al.*, 2012; Tsunoda *et al.*, 2002).

Among the extreme factors of the North, the first are the meteorological factors associated with low temperatures, sudden changes in temperature and

atmospheric pressure; the geophysical factors, which are associated with the vulnerability of the earth from cosmic rays, geomagnetic perturbations, gravitational disturbances, infrasound radiation and, finally, violated photoperiodicity caused by changing polar night with a polar day and quite high spring and low winter insolation (Panin, 2013).

In the North are much more of a stress (anxiety), poor diet, lack of exercise, bad habits (Smoking, alcoholism) (Manchuk and Nadtochiy, 2010).

The environmental changes associated with mining have led to changes in the routes of wild reindeer and phytobenthos in lakes and reservoirs. All these reasons led to the fact that the diet of the indigenous inhabitants at present has changed radically.

In this regard, the aim of this study was to evaluate the impact of some demographic and socio-economic factors on the formation of dietary habits of the population of village Gilindi of Oleneksky region of the Republic of Sakha (Yakutia) to the development of the Tomtor Deposit of rare earth metals.

MATERIALS AND METHODS

The study was carried out within the research project "Assessment of health status and quality of life of the population of the Olenek region-the future on the mining of rare earth metals (niobium)".

There was a wide medical examination of inhabitants of 150 village Gilindi of Oleneksky Evenki national district in the Sakha Republic (Yakutia) (Fig. 1). Applied survey used the international questionnaires WHOQL 100 and programs CYNDI of eating behavior, depression scale, self-evaluation of the body structure and the desired speed of weight reduction. There was analyzed the food diary. Expedition departure took place in April, 2015 by winter road in village Gilinda of Oleneksky district in the period of decrease in frosts and exacerbations of chronic diseases.

Inclusion criteria: All residents of village Gilinda, agreed to participate in this study. For the survey of the adult population of village Zelinda was formed to be

representative by sex and age a sample of 150 people, including 69 men (54%), 81 women (69%). The average age of the surveyed women and men was 44 years (33.0-56.0) and 39 years (30.0-53.0) respectively.

RESULTS AND DISCUSSION

Table 1 presents a frequency of consumption of foods residents of vill. Gilinda (n = 150). According to the results of the analysis of data were: 53 (76.8%) men and 59 (72.8%) of women consumed meat (venison) every day or almost every day. The vast majority of men and two thirds women (69.1 85.5%, respectively) consume fish at least 1-2 times a week. The vast majority of men and three quarters of women (88.4 and 75%, respectively) eat pasta daily. Every fifth of the respondents consume cereals daily and several times a week; every third-at least 1-2 times a week. Sugar eat 86.8% of men and 84% women. Bread and bakery products are consumed daily 67 (97.1%) men and 79 (97.5%) of women. Every fifth man and every third woman eat sweets (cookies, candy) daily or several times a week (22 and 33%, respectively). The most part of the population does not eat or eat rarely these kinds of products: potatoes and other vegetables (90.6%), fruits and juices (94.6%), sausages (91.3%), eggs and milk (96.1%), cocoa or coffee (88.7%), carbonated drinks (96.4%). Differences were not revealed in the use of basic food (p>0.05), the exception was the consumption of sweets, more often in women (p = 0.03).

The nature of nutrition was significantly correlated with mortality from coronary heart disease, cerebrovascular disease, cirrhosis and cancer (Humnagadaev, 2004). The authors claim that some dietary factors correlated with higher mortality rates (saturated fatty acids, salt) and others a decrease (polyunsaturated fatty acids, especially omega-3 fatty acids, potassium, magnesium, fruits, vegetables, antioxidants). Humnagadaev (2004) showed that 542 people from the indigenous rural population of the typical villages of Yakutia and Evenkia have a high intake of protein in the winter season, while the residents of Novosibirsk and Buryatia consume less protein. Male rural indigenous population of Yakutia

Table 1: Frequency of consuming individual food groups residents of vill. Gilinda

	Men n = 69				Women n = 81				p
	Daily	Few times a week	1-2 times a week	Rarely/newer	Daily	Few times a week	1-2 times a week	Rarely/newer	
Bread (%)	97.1	-	-	2.9	97.5	0	0	2.5	0.7
Cereals (%)	21.1	33.3	22.8	22.8	18.5	38.5	20	23.1	0.9
Pasta (%)	88.4	10.1	1.5	-	75	20	2.5	2.5	0.2
Potato (%)	4.4	2.9	5.9	86.8	1.2	1.2	3.7	93.8	0.5
Meat (%)	76.8	17.4	1.5	4.4	72.8	17.3	2.5	7.4	0.8
Fish (%)	21.7	34.8	29	14.5	13.6	18.5	37	30.9	0.8
Eggs (%)	1.6	7.8	4.7	85.9	1.3	1.3	1.3	96.2	0.2
Sugar (%)	86.8	7.4	2.9	2.9	84	4.9	-	11.1	0.1
Cookies candy (%)	11.3	33.9	11.3	43.6	11 (14.1)	21.8	16.7	47.4	0.4
	3.1	38.5	18.5	40	12 (15.2)	21.5	17.7	45.6	0.03

p: the statistical significance of the differences in the Pearson's χ^2 test with contingency tables with multiple responses



Fig. 1: Map of the Republic Sakha (Yakutia)

consumes significantly more fats than residents of Evenkia, Chukotka, Kyrgyzstan, Central Russia and Central Siberia. Men-the Yakuts consume cholesterol in degrading products about as much as the people in the villages, but more than the inhabitants of Central Siberia, which, however, is not accompanied by a significant hypercholesterolemia. In this regard, separately examined the intake of oil and butter depending on gender and age.

Vegetable oil is mainly used for cooking. The most commonly used by men aged 55-64 years (88.9% daily) and most rarely used by women aged 65 years and over (50.0% of daily). At the age of 24 years men used vegetable oil to 14.6-21.4% more often than women. Overall vegetable oil uses every day the 75.2% of the population, 1-2 times per week-15.4%, several times a week-3.4%, rarely or never use is 6.0% (Fig. 2).

In the survey sample butter is used more often by males in the age of 45-54 years and persons of both sexes aged 65 years and older (daily 100%). Less used by men in the age of 35-44 years (daily 75%). Women use butter less often than men in the age of 25-34 and 45-64 years, men in the age of 35-44 years. Overall 88.0% of the population use butter daily, 1-2 times a week in 4.7%, several times a week- 2,0%, rarely or never use in 5.3% (Fig. 3).

The study of socio-demographic characteristics showed: 12% of respondents were highly educated, among women the share of persons with higher education was higher (13.6 vs. 10.5%). Secondary or secondary special education had 77.6% of men and 71.6% of women. In 11.9% of men and 14.8% women did not have a high school education. 46.7% of respondents-worked; 5.3% were studying and 47.3%-were not working and not studying. The average total monthly income of the

Table 2: Level of income depending on age

Age, years	Monthly income, (Rubles)
15-24	10092,0
25-34	18330,8
35-44	22409,4
45-54	22792,6
55-64	17835,6
65 and above	21000,0
Middle (M ± δ)	19278,4±12627,4

respondents was 19278,2 ruble (\$271,6). The level of total average monthly income by age are presented in Table 2.

From the results of table shows that the highest income are persons aged from 35 to 55 years. As the main source of income of 44.7% said salary and 24% retired, 8% for allowance, 11 and 7% didn't answer. Personal income is divided into 3 levels: more than 15000 from 10000 (\$140,9) to 15000 (\$211,38) and less than 10,000 rubles. Half of the population has a personal income of less than 10,000 rubles. More than 15,000 rubles have 32% of the respondents. Women were more likely to be persons with a personal income of more than 15,000 rubles (34.6% versus 29), whereas more than half of men had a personal income of less than 10,000 rubles (58%).

Thus, the results of study of food of indigenous peoples of the North frequency method, which enables a certain degree of probability to judge about the possible shortage or excess of nutrients, vitamins, minerals. Obtained in the present study, the data give grounds to make the assumption about alleged sufficient consumption of meat and fish products. However, ¼ of the population every day consumes venison and fish products, which represent the basic part of the diet of

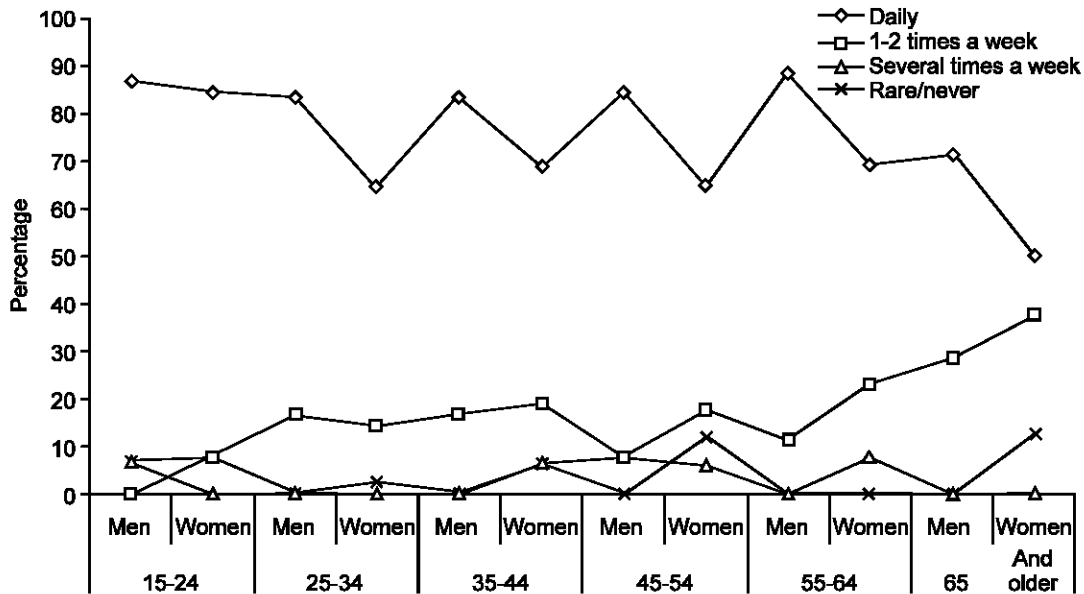


Fig. 2: Use of vegetable oil depending on age and gender

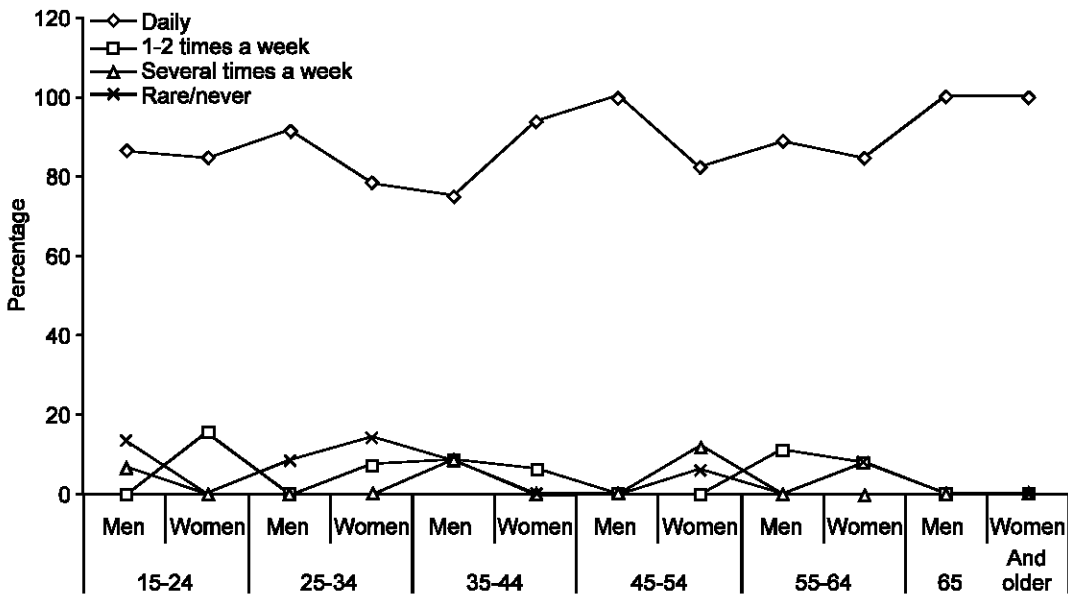


Fig. 3: Use of butter, depending on age and gender

indigenous peoples of the North. That is very disturbing in the modern socio-economic conditions of society. Regarding the frequency of consumption of fruits, vegetables, dairy products and eggs, the results of the study indicate an almost complete absence of their use that suggests a possible shortage of vitamins C, D, E and calcium. Draws attention to the frequent use of such foods as cereals, pasta, sweets, sugar. In the analysis of socio-demographic factors draws attention to the low standard of living of the respondents, the average total family income is less than 10,000

roubles (\$140,9). These figures contradict the data of Table 2. The personal income half of the population is less than 5000 rubles (\$70,4). The diet of the population is directly dependent on aggregate income. Thus, the diet of the surveyed sample is unbalanced and implies a lack of mineral salts and vitamins in the diet, which requires further study. The solution to the problem is in the organization of nutrition based on the genetic peculiarities and folk traditions. The authors gratefully acknowledge the funding and conduct of research for the Head of Oleneksky Evenki national district, Mr. Aleksandr Stepanovich Ivanov.

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