Nutritional as a factor of vital capital

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Abstract. Allocate such components of human capital as health capital, cultural, moral, labor, intellectual, organizational and entrepreneurial, social, structural, organizational. Researchers pay most attention to the intellectual and educational side of human capital. Much less attention is paid to health potential. The authors believe that it is necessary to talk not just about health capital, but to use the broader, more comprehensive concept of “vital capital”. It includes the physiological characteristics and abilities of a person, social values, a system of knowledge and skills of a healthy lifestyle. Maintaining human health and developing vital capital depends on a rational and healthy diet. Human nutrition, especially in the extreme conditions of the Arctic and subarctic regions, should not only provide him with all the necessary nutrients, but also perform preventive and therapeutic functions. In the northern regions, daily energy costs increase to 3300-4000 kcal; in the diet, the proportion of fats and proteins increases and the amount of carbohydrates decreases. The population of the northern regions is deficient in certain vitamins, minerals, dietary fiber, and biologically active substances. Therefore, when compiling rations, it is necessary to include plant foods and the use of enriched and specialized foods. The staff of the Higher School of Biotechnology and Food Production of Peter the Great St. Petersburg Polytechnic University have developed formulations and technologies for specialized and functional products, which can also be recommended for nutrition of people living in the northern regions. This is a culinary product using spelled grain, optimized for protein content and amino acid composition; flour products based on millet flour and flour from germinated millet grain, which have high biological value; cookies based on pumpkin seed flour, high in minerals; flour confectionery from oat flour with a high content of non-starch polysaccharides, dietary fiber and phenolic compounds; as well as frozen universal vegetable semi-finished products for the production of soups with a high content of antioxidants.

1. Introduction
By the end of the 19th century a trend in economic theory had emerge, which interpreted a human and his capacities as capital. J.B. Say, W. Rosher, F. List comprehended capital as acquired and inherited qualities and capacities of a human. In contrast to them such economists as I. fon Tuten, I. Fisher, J. M. Clark and others declared a human himself as capital [1].

As a separate division of economic analysis the theory of human capital formed in 50-60th of the 20th century.

In general, meaning human capital is considered as a complex of characteristics of physical health, education, professional experience, which determines the capacity of a human for effective highly qualified labor. Development of human capacities is represented as capital accumulation.
At present, there are various definitions of the term “human capital” in a number of respected sources. Generally described, human capital is an inherent or intentionally acquired state of such factors as physical condition, education and skills, inclinations and capacities, energy and motivation, as well as cultural level of an individual, a community or the whole society. They are used reasonably in different production of society and promote economic growth, influence on income rate of their possessor [3].

The term of human capital contains several categories that are divided into:
- Inalienable human capital (illiquid capital) which is represented by health capital (biophysical capital), cultural and moral capital, labor capital, intellectual capital, entrepreneurial capital;
- Alienable human capital (liquid capital) which contains social capital, customer (brand) capital, structure and organization capital [4].

Most contemporary scientific works investigate successfully such matters of forming human capital as intellectual and educational human development. However, it could be reasonable to consider health potential which is researched much less. Health capital consists of a few criteria, such as general physical condition and strength, endurance, working efficiency and immune characteristics. All of them are important for every member of the society, as these are the key parts of professional life prolongation. Consequently, health capital, being a congenial factor of the human capital, needs investment and development to elongate the time of active life, reduce morbidity and enhance working efficiency. A human carries the responsibility for his health and it depends on his lifestyle, health precaution and promotion, diagnostic procedures. Analysis of the situation in our country reveals that high disease rate, large number of chronic ailments, high premature death rate still remains a serious problem for the society. There is an opportunity to improve this situation on the social and economic levels.

The truth is that effective healthcare system is considered to be the most important condition to maintain and develop human capital and what is more, increasing investments is necessary in this sphere [6]. However, to form skills for healthy lifestyle is becoming more important nowadays. Along with this, informational efforts of different subjects of social policy are growing more earnest, this can provide that the stereotype of a person of health would gain prestige value and make healthy lifestyle the priority. There are certain conditions influencing the human health, and 20% of the influence is due to genetics, 20% due to the ecology and 50% of the influence is due to social and economic environment, states the World Health Organization (WHO). The impact of the effectiveness of health care system and the quality of medical service amount 10 % only.

The connection between the condition of health and life style is becoming apparent in postindustrial society. On this basis, three lines of mutual influence exist:
- lifestyle of the population of the country defines the demographic and social stratification patterns, as well as performances as the key factor in birth and death rates and life expectancy.
- the quality of health capital, as well as intellectual resources and labor capital, depends of the society’s lifestyle, and therefore it influences the international competitiveness of the community and its performance in economic and social fields.
- social and cultural factors define consumer behavior that is based on national tradition, confessional and cultural preferences of a population of a country. It is of primal importance to consider that increasing rate of ethnic conflicts changes traditions and preferences of the global community.

From the view of social and demographic interaction, reproduction of a population comes to the first place. Moreover, this is meant to be not only replacement of the population, but also a general process of resumption in its whole variety of physical and social features, determined by its quantity and quality.

Lifestyle of a population of the country is a social and economic factor that influences on health of the population and interlocked with the process of developing a harmonious person which is extremely important because intensification of manufacturing rocketed up, placing emphasis on information component and decreasing the level of physical loads dramatically. Stressful psychological
environment inside the society because of rivalry of market economy, especially in employment market, high risk sharing portion in professional and production relations demand reasonably balanced work-rest rhythm for a person who works in such intensive employment conditions.

Inspite the positive tendencies [7, 8] that have taken shape in the beginning of the 21st century, the state of health of the population and demographic situation in Russia are far apart from their rate in economically developed countries. According to different research demographic situation in Russia is characterized as inertial and it is proved by asymmetrical age-sex pyramid [9].

2. Main part
Nowadays researchers share the opinion that arrangements that determine demographic process depend on variety of factors, including the state of health care and factors that are connected with life style and behavior of a person like habits, skills, education, nutrition, work and rest management [10].

For this reason, besides analyzing the importance of health as a factor that influences the quality of human capital, we consider it necessary to discuss not only human capital but also to use more general and complex term of *vital capital*. We suggest that vital capital includes three elements that provide vital force of a person:

- Physiological characteristics and abilities of a person either innate or gained through life;
- Healthy lifestyle as a social value and priority for a person that can be recognized as a form of socialization, along with it promoted and stimulated by all social institutions (family, the workforce, local and state authorities)
- System of knowledge and skills for obtaining healthy lifestyle as a form of gaining vital component of human capital that belongs to either a person or entire society.

To provide conditions for maintaining and gaining vital capital appears to be a multivariate problem to solve and realize practically. Varrava M.U. stands that along with widespread scientific interest in human capital issues, its vital aspect is not investigated properly [11]. According to authors’ opinion, gaining vital capital means to support personal and social development by providing information, healthy lifestyle training, and developing skills of vital importance. Due to this people begin to bear new possibilities to manage their personal health and environment and to take an option on health promotion. Extremely important to provide people with opportunity to learn during lifetime, prepare to every age stage and cope with difficulties and diseases. Appropriate steps should be taken through channels of educational, professional, commercial and public bodies.

Currently there are certain steps, taken by the United Nations and aimed at encouraging governments in different countries to perform some actions to research their population’s health potential. Thus more than 140 countries participate in an appropriate project of mapping this potential. In Russian Federation several legislative acts operate in health care of the population, purpose-oriented programs realize health care development, certain concepts operate to provide health protection of the population. Realization of a national project “Health” makes a great impact into maintaining health potential of the nation. Under this project measures for propaganda of healthy lifestyle receive increased financing. Along with this, important characteristic of the purpose of this project shows shift in emphasis on preventive medicine and health service, representing main principle to maintain vital capital of the nation. One of long-term social and economic prospects of the project, in case of success, is the reduction of economic loss due to labor potential recovery and the reduction in expenditure on invalidity and temporary disability pension payments.

However, it seems to be impossible to solve a problem of maintaining health capital without participation of a person, therefore different social programs focused on developing *health culture* obtain serious importance. All these belong to integral part of educational component that maintain vital element of health capital.

It is important to notice that financial costs on social measures consist of outlay for social advertisement, propaganda of sport activities, healthy nutrition, bad habits rejection and improvement of public education level in maintenance and improvement of health.
Romanovsky A.V. and Moiseev M.S. revealed interconnection between vital capital and GDP [12]. However, economists hardly investigate the question how health maintenance and vital capital are influenced by cultural and systems skills for rational and healthy nutrition. This problem demands complex approach from proper calorific value and rational combination of nutrient elements in products to rational management of manufacturing and consuming food as an important component of high life quality. In addition to this, such research work is rather active and widespread in a lot of scientific fields, however, it needs unification and systematization. The medical study of the full value nutrition and its influence on the physical condition of the population is now extremely important and can’t be underestimated. Meanwhile, the study of the full value nutrition effect on health rate of homogeneous demographic and professional groups gain a special meaning for discussion on specialized nutrition. Although the task of rational nutrition does not consist of physiological and energetic aspects only, it also fulfills preventive and therapeutic tasks. It is also necessary for it to satisfy certain organoleptic and physicochemical indices and to consider social and personal factors together with economic, cultural, confessional factors etc. Since this problem is not solved yet in any country around the world, it remains actual nowadays.

Russian Federation runs the state program aimed at healthy nutrition of the community, that eliminate full value protein shortage alongside with exclusion of the shortage of several vitamins, minerals, polyunsaturated fatty acids, dietary fibers. It also provides measures for improvement nutrition of children and teenagers, pregnant women and nursing mothers and controls the quality of domestic and imported food products. Under this state program, it is possible to run measures to increase public educational level in terms of healthy nutrition as well. To form coordinated state and social policy in healthy nutrition is considered to be a vital task to fulfill since obtaining a diet that does not meet physiological demand of the body, constitute a threat to national security.

A number of social institutions such as family and educational system are responsible for forming culture of healthy nutrition, since that many educational programs that form the basis for rational diet and healthy lifestyle work in many educational facilities and fulfill the task to decline food incompetence.

Discussing the question of rational nutrition, it is significant for every region in Russia, although there are several singularities that are specific for every climate zone and region.

It is of importance that approximately 60% of the territory in Russian Federation belong to arctic and subarctic areas and regions, equivalent to them, and consist of more than 11 million square km in 25 subjects of the federation [13]. Meanwhile, areas with cold climate are characterized by low temperatures, high humidity, strong winds and sever atmosphere pressure drops with irregular photoperiodicity and other singularities. Therefore, they affect life style of people, their professional and domestic life, and determine a certain balance between human body and environment.

Considering nutrition process, it performs itself as a part of acclimatization for newcomers. A person, who lives in extreme climates, belongs to so called polar metabolic type which is characterized by higher energetic importance of proteins and fats, and lower meaning of carbohydrate. According to recommendations of World Health Organization Committee it is necessary to increase energy value on 5% with decrease of monthly mean temperature on every 10° starting with 10 °C. Climate peculiarities of arctic area and working conditions there lead to growth of main metabolism and total daily energy consumption. Main metabolism of newcomers, especially of those, who work outside, increases on 13% and for some people it grows on 25-30 % and holds the rate of 115-117 % that indicates enduring physiological adaptation. Daily energy consumption increases on 3300-4000 kcal though local population has lower meaning of energy consumption 2800-2900 kcal daily. For aboriginal population of North increased protein intake up to 15% of main energetic value of ration supports high immune reactivation, increased meaning of fats (up to 35%) and carbohydrate (50%) cover energy needs [14]. According to recommendation of World Health Organization and European Society of Cardiology (2012) optimal proportion of protein, fat and carbohydrate is 1:1:3 in the North.

Selection of food products for inhabitants of Arctic and Antarctic is rather limited and consists mostly of meat and fish. There is a serious lack of dairy products, vegetables and fruits. Epidemiologic
nutrition research shows that actual diet of the population of the North of Russia suffer from disbalance in nutrient composition [15]. Protein, fat and carbohydrate proportion moves to consuming protein of meat and fish. Together with this, increasing energy value of a diet leads to higher rate of consuming saturated fat that causes excessive weight and high cholesterol rate. Due to certain peculiarities of metabolic process, atherosclerosis and its health complications (cardiac infraction, cerebrovascular accident) occupy about 10% of pathology structure of local population along with transient ischemic attack, which also happen rather often.

Discussing metabolism of newcomers in the North, sugar rate in blood goes down on 40-45% because of higher energy consumption and intensified oxidation of deposited fats, glycogen and glucose afterwards, especially during polar night. Decline of sugar rate in blood causes rise of renal carbohydrate barrier and dysfunction of pancreas gland [16]. Underoxidated fats move acid-alkaline balance of a body towards acid part. Different manifestations in Arctic such as polar shortage of breath, psycho-emotional lability, asthenia, hypertension are evoked by hypoxia and hypoglycemia as well. They compose the notion of the polar tension syndrome that is not a disease but specific process of adaptation of non-indigenous population to extreme conditions.

The research of metabolism of the population of the far North, which was run by the Institute of Nutrition, Academy of Medical Sciences, USSR, showed that along with disturbance in fat and carbohydrate metabolism there is also shift in protein metabolism: balance of nitrogen and minerals on average was negative in various degrees and protein digestibility was less than 80% for most testees [17], [18].

Changing the structure of a diet of a person leads to different demand for certain vitamins and minerals. Taking into account the condition of Russian far North, such a demand is almost twice higher, what is more, there is a certain grow in demand of fat-soluble vitamins, especially tocopherols. It is proved that they influence on muscular and reproductive systems and work as antioxidants to protect unsaturated fatty acids from non-enzymatic free radical oxidation.

The lack of solar radiation causes shortage of vitamin D that can influence negatively on Calcium-Phosphorous metabolism [19]. That is why there is reason to believe that it is necessary to apply extra D-fortification of food and preventive ultraviolet irradiation of population, especially children in Arctic region.

There is also shortage of vitamin B in Arctic region because of lack of necessary vegetable products. Vitamin B group participate in protein and lipid metabolism and support nerve system and its functioning. According to results of research held by Efremov V.V. the daily dose of vitamin B group for northern population should be twice bigger and consists of thiamine 4-5mg, riboflavin 3-4mg, niacin 30-40 mg [20].

The demand of northern population for vitamin C according to research of Danishevsky G.M, Pushkina N.N and others, is estimated as twice higher comparing to results for moderate climate zone.

Taking into account the results for non-indigenous population, people assimilate minerals less effectively and suffer from disturbance of Phosphorous metabolism with its increased excretion and negative balance. Many researchers claim that low-mineralized water causes serious impact in people’s health even increased level of cardiovascular, oncolgical and other diseases. In connection with above, it is recommended to add into drinking water special salt mixtures, seawater or filter it applying marble crumb. Other researchers do not place importance on mineral composition of water and consider food products as main suppliers of minerals into the human body. The value of water as a carrier of minerals is identified only for Calcium and Fluorine when the lack of the first can be felt only with improper food supply, the lack of the last can be detected due to improper water composition. Low level of selenium in drinking water in the North declines anticarcinogenic, antioxidant activity and suppresses immune system. Low-mineralized river water of the North contains little Fluorine that helps wider dental caries extension.

In the North people gain higher radiation-absorbed dose which is caused by energy-intensive short-lived nuclides. Indigenous people get excess of nuclides through ecological food-chain: moss-reindeer-human, that is why there is necessity to increase level of antioxidants (flavonoids, carotenoids
etc.) in food products, they suppress lipid peroxidation, and enhance the level of calcium salt, they remove radioactive strontium out of bones. Along with above, consuming food products that contain pectin substances facilitates the same process.

The low content of dietary fiber is another insufficient factor of nutrition. In fact, its daily consumption makes up about 18 gr instead of recommended 25-40 gr [21].

So, inhabitants of Arctic area need food products, enriched with vitamins, minerals, dietary fiber, antioxidants. Russian researchers develop specialized and functional production, which should be included into diet of inhabitants of northern area. These are grain products made from Russian crops that are rich in bioactive substances and dietary fiber, mineral substances.

Peter the Great's Higher School of Biotechnology and Food Production at St. Petersburg Polytechnic University has developed recipes and technologies for specialized and functional products, which can also be recommended for people living in the Arctic and subarctic regions.

Bazhenova T.S. developed flour products from biscuit, shortbread and brewed dough based on millet flour and flour from germinated millet grain, which have high biological value [22], [23].

Bazhenova I.A. developed culinary products using spelled grain, optimized for protein content and amino acid composition [24].

Moskvicheva E.V. et al. developed cookies based on pumpkin seed flour, one hundred grams of which provides 44% of the daily requirement for magnesium, 50% for selenium, 39% for copper, 48% for phosphorus, and 46% for manganese [25].

Sergeeva S.S. has developed flour confectionery from oatmeal with a high content of non-starch polysaccharides, dietary fiber and phenolic compounds [26].

Eliseeva S.A. proposed frozen universal vegetable semi-finished products for the production of soups with a high content of antioxidants [27].

Peculiarities of food supply in high latitude area are limited possibility to produce food products domestically, seasonal coming-in, big food storage. The matter is that storage of most food products does not raise any difficulty, though thawing-and-freezing meat, fish, vegetables and fruits declines either organoleptic qualities or food nourishment value of all of them.

It is important to add that Arctic area is supplied with refinery sugar with ascorbic acid, powered milk with ascorbic acid and calciferol, edible fat with retinol, flour with thiamine, riboflavin and niacin, canned fruit and vegetables with ascorbic acid and retinol.

To provide indigenous population and newcomers with food products in Arctic area it is necessary to introduce and develop new technologies in food and agricultural industry. Establishing complex quality control system will contribute competitive recovery of local production, physical and price accessibility of socially-significant food products according to recommended rational consumption rate in far North. Selling food products, produced mostly by local manufactures, in distributing facilities is the priority direction.

3. Conclusion
The preservation and growth of vital capital in the difficult climatic conditions of the North has its own specific features, including in the diet. Influence of extreme factors of Arctic area requires to optimize nutrition of indigenous population and newcomers of the North. It is necessary to review quality and quantity composition of their diet: daily energy costs increase to 3300-4000 kcal; the optimal ratio of proteins, fats and carbohydrates is 1: 1: 3. Rationalization of a diet does not only consist of physiological and energetic aspects, it should also fulfill preventive and therapeutic tasks. To provide effective adaptation it is necessary to provide population with macro and micronutrients, dietary fibers, vitamins, antioxidants.

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