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## HYGIENIC ANALYSIS OF THE DAILY DIETARY INTAKE OF MINING WORKERS

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***Abstract.*** *A hygienic assessment of the nutritional status of workers employed in a mining complex was conducted during the summer season. The study primarily involved 528 voluntary workers from the complex. The hygienic analysis of the daily dietary intake revealed an insufficient consumption of foods rich in high-quality proteins, vitamins, and minerals, whereas an excessive intake of carbohydrates and fats was observed. It was concluded that this imbalance in dietary composition may adversely affect the workers' health status and overall work productivity.*

***Keywords:*** *Workers' nutrition, autumn season dietary intake, hygienic analysis, types and consumption levels of food products, physiological norms.*

## KON ISHCHILARINING KUNLIK RATSIONINI GIGIYENIK TAHLIL QILISH

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***Annotatsiya.*** *Tadqiqot kon majumasida faoliyat olib borayotgan ishchilarning yoz mavsumida ovqatlanish holatini gigiyenik tahlili olib borilgan. Tadqiqotda asosan kon majmuasidagi 528 nafar ko'ngilli ishchilarining jalb qilingan. Kunlik ratsionini gigiyenik jihatdan tahlili yuqori qiymatli oqsil, vitamin va mineral moddalarni saqlovchi mahsulotlar kam iste'mol qilinganligi aniqlangan bo'lsa, uglevod va yog'lar ortiqcha iste'mol qilinganligi bu holat ishchilarning ish unumdorligi va salomatlik holatiga ta'sir qilishi mumkin deb xulosa qilindi.*

***Kalit so'zlar:*** *Ishchilarining ovqatlanishi, kuz fasli ovqatlanish holati, gigiyenik tahlil, oziq-ovqat mahsulotlarining turlari va ta'minlanganlik darajasi, fiziologik meyor.*

## ГИГИЕНИЧЕСКИЙ АНАЛИЗ СУТОЧНОГО РАЦИОНА РАБОТНИКОВ ГОРНОДОБЫВАЮЩЕЙ ПРОМЫШЛЕННОСТИ

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***Аннотация.*** *В рамках проведённого исследования был осуществлён гигиенический анализ состояния питания работников, занятых в деятельности горнодобывающего комплекса, в летний сезон. В исследование были преимущественно включены 528 добровольных работников данного комплекса. Гигиеническая оценка суточного рациона показала недостаточное потребление продуктов, богатых полноценными белками, витаминами и минеральными веществами, тогда как отмечено избыточное потребление углеводов и жиров. Установлено, что данная диспропорция в структуре питания может оказывать неблагоприятное влияние на состояние здоровья и уровень трудоспособности работников.*

***Ключевые слова:*** *Питание работников, осенний рацион, гигиенический анализ, виды и уровни потребления продуктов питания, физиологические нормы.*

**Introduction.** The health status and work productivity of employees engaged in industrial enterprises are directly dependent on their dietary intake. A properly structured diet ensures energy metabolism, supports immune function, and maintains both physical and mental endurance in workers. Therefore, the hygienic balance of workers' nutrition plays a crucial role in sustaining labor efficiency and occupational stability [2,8,11].

A number of studies indicate that industrial workers, particularly those employed in manufacturing sectors, often experience deficiencies in proteins, vitamins, and essential minerals within their daily diet. For instance, the consumption of meat, fish, dairy products, and vegetables is frequently below recommended levels, leading to inadequate intake of proteins, calcium, and micronutrients [3,5,10]. At the same time, excessive consumption of carbohydrates and fats increases the risk of metabolic disorders, overweight, and cardiovascular diseases [6,12].

The methodology for assessing nutritional hygiene is based on both international and national standards. Recommendations by FAO/WHO provide guidelines for calculating dietary requirements, caloric intake, and nutrient balance for the working-age population. In addition, studies conducted under the conditions of Uzbekistan demonstrate the importance of evaluating workers' diets in accordance with established hygienic norms [11,14].

The study of workers' dietary patterns during the autumn season is of particular relevance, as working conditions, climate, and seasonal changes

significantly influence dietary composition. For example, while colder seasons require higher caloric intake to maintain energy and thermal balance, autumn is often associated with reduced consumption of fruits and vegetables, and protein sources may become insufficient. Therefore, assessing the compliance of workers' diets with hygienic standards and determining the balance of food components during autumn is essential [1,4,9].

The dietary patterns of workers in potassium production enterprises during the autumn season have a direct impact on their health, work efficiency, and occupational stability. Developing a diet aligned with hygienic standards, ensuring adequate intake of proteins, vitamins, and minerals, and controlling excessive consumption of carbohydrates and fats are necessary measures to improve labor capacity and maintain occupational health [7,13,15].

Furthermore, hygienic analysis of dietary intake contributes to balancing workers' physiological needs with actual food consumption under industrial conditions. This study aims to quantitatively assess the food products consumed by workers during the autumn season and to identify both normative and imbalanced aspects of their diet.

**Objective:** The study aimed to hygienically assess the daily dietary intake of workers during the autumn season.

**Materials and Methods:** The study was conducted in 2022–2025 at the mining complex of the Dehkanabad Potash Plant involving 528 workers. The actual nutritional status was assessed using a specialized questionnaire, followed by data collection and analytical evaluation of the daily dietary intake composition.

**Results:** The study was conducted during the autumn season (September, October, and November). The indicators used to assess the nutritional status of workers are presented below.

**The quantitative level of food products consumed by workers of a potassium production plant during the autumn season**

| № | Food products | Food products | Food products | Food products | Food products |
|---|---|---|---|---|---|
| **Cereals and flour products** | | | | | |
| 1 | Legumes | 30 | 24 | 80,0 | -6 |
| 2 | Wheat flour | 30 | 37 | 123,3 | 7 |
| 3 | Rice | 60 | 51 | 85,0 | -9 |
| 4 | Groats (excluding rice) | 25 | 14 | 56,0 | -11 |
| 5 | Wheat bread | 250 | 452 | 180,8 | 202 |
| 6 | Rye bread | 100 | 16 | 16,0 | -84 |
| 7 | Pasta | 60 | 81 | 135,0 | 21 |
| **Vegetables and melons (gourd crops)** | | | | | |
| 8 | Potatoes | 280 | 221 | 78,9 | -59 |
| 9 | Cabbage | 55 | 22 | 40,0 | -33 |
| 10 | Cucumbers | 50 | 15 | 30,0 | -35 |
| 11 | Tomatoes | 70 | 23 | 32,9 | -47 |
| 12 | Beetroot | 40 | 16 | 40,0 | -24 |
| 13 | Carrot | 50 | 49 | 98,0 | -1 |
| 14 | Onion | 50 | 50 | 100,0 | 0 |
| 15 | Other vegetables | 70 | 46 | 65,7 | -24 |
| 16 | Melons | 60 | 76 | 126,7 | 16 |
| 17 | Pumpkin | 40 | 28 | 70,0 | -12 |
| **Fruits** | | | | | |
| 18 | Fruits | 250 | 191 | 76,4 | -59 |
| 19 | Dried fruits | 25 | 12 | 48,0 | -13 |
| 20 | Grapes | 40 | 21 | 52,5 | -19 |
| 21 | Citrus fruits | 10 | 12 | 120,0 | 2 |
| **Meat products** | | | | | |
| 22 | Beef | 70 | 1 | 1,4 | -69 |
| 23 | Mutton | 30 | 21 | 70,0 | -9 |
| 24 | Rabbit meat | 40 | 0 | 0,0 | -40 |
| **Poultry products** | | | | | |
| 25 | Poultry | 70 | 26 | 37,1 | -44 |
| 26 | Eggs (units) | 1 | 1 | 100,0 | 0 |
| **Fish products** | | | | | |
| 27 | Fish | 45 | 13 | 28,9 | -32 |
| 28 | Fish products | 30 | 6,9 | 23,0 | -23,1 |

| | | | | | |
|---|---|---|---|---|---|
| **Dairy products** | | | | | |
| 29 | Milk | 400 | 112 | 28,0 | -288 |
| 30 | Sour cream, cream | 25 | 9,3 | 37,2 | -15,7 |
| 31 | Butter | 35 | 30 | 85,7 | -5 |
| 32 | Cottage cheese | 50 | 0 | 0,0 | -50 |
| 33 | Cheese | 30 | 0 | 0,0 | -30 |
| **Confectionery products** | | | | | |
| 34 | Confectionery | 40 | 68 | 170,0 | 28 |
| 35 | Sugar | 35 | 41 | 117,1 | 6 |
| **Other products** | | | | | |
| 36 | Honey | 30 | 16 | 53,3 | -14 |
| 37 | Margarine | 5 | 7 | 140,0 | 2 |
| 38 | Vegetable oil | 35 | 43 | 122,9 | 8 |
| 39 | Iodized salt | 5 | 9,5 | 190,0 | 4,5 |
| 40 | Coffee | 2 | 3,5 | 175,0 | 1,5 |
| 41 | Tomato paste | 5 | 7,8 | 156,0 | 2,8 |
| 42 | Spices | 2 | 3,6 | 180,0 | 1,6 |

During the autumn season, a comparative analysis of the daily dietary intake of workers at a potassium production enterprise against established physiological norms revealed significant imbalances. Within the group of cereals and flour-based products, consumption was unevenly distributed. Legume intake was 20% below the recommended level (−6 g), indicating insufficient provision of plant-based proteins. The consumption of rice (85.0%) and groats (56.0%) was also below standard values, suggesting a deficiency of complex carbohydrates in the diet. At the same time, the intake of wheat flour (123.3%), pasta products (135.0%), and especially wheat bread (180.8%) exceeded recommended levels, contributing to excessive carbohydrate consumption. In contrast, rye bread consumption was markedly low (16.0%).

Analysis of vegetable consumption demonstrated inadequate intake of cabbage (40.0%), cucumbers (30.0%), tomatoes (32.9%), beets (40.0%), and potatoes (78.9%). Although carrot (98.0%) and onion (100.0%) consumption approached recommended levels, the overall insufficient intake of vegetables may result in deficiencies of essential vitamins and minerals. Only melons and gourds (126.7%) were consumed above the norm.

The consumption of fruits and dried fruits was also suboptimal, with fruits at 76.4%, dried fruits at 48.0%, and grapes at 52.5% of recommended levels. Citrus fruit consumption reached 120.0%, indicating a partial supply of ascorbic acid-rich foods.

Significant imbalances were observed in the intake of meat and other protein sources. Beef consumption was extremely low at only 1.4% (−69 g), indicating a severe deficiency. Mutton (70.0%) and poultry (37.1%) consumption were also below recommended levels. Rabbit meat and certain other protein sources were not consumed at all. Fish and fish product consumption amounted to 28.9% and 23.0%, respectively, indicating inadequate intake of unsaturated fatty acids.

Deficiencies were also evident in milk and dairy products. Milk consumption was only 28.0% (−288 g), which may lead to insufficient intake of calcium and high-quality proteins. While sour cream and cream (37.2%) and butter (85.7%) showed relatively closer values to recommended levels, cottage cheese and cheese were not consumed at all.

The consumption of confectionery products and sugar exceeded recommended levels, with confectionery at 170.0% and sugar at 117.1%, contributing to excessive intake of simple carbohydrates and increasing the risk of metabolic disorders.

Analysis of other food products showed low consumption of honey (53.3%), whereas vegetable oil (122.9%), margarine (140.0%), and iodized salt (190.0%) were consumed above recommended levels. Additionally, excessive intake of coffee (175.0%), tomato paste (156.0%), and spices (180.0%) was observed.

In conclusion, during the autumn season, the daily dietary intake of workers at the potassium plant was unbalanced, characterized by deficiencies in proteins, vitamins, and minerals, alongside excessive consumption of simple carbohydrates and certain fats. This imbalance may adversely affect workers' health status and occupational performance...

**Conclusion:** The hygienic assessment of the daily dietary intake of workers at the potassium plant during the autumn season revealed significant deviations from physiological norms across a number of food groups. It was determined that foods rich in high-quality proteins, vitamins, and minerals were insufficiently consumed, whereas the intake of carbohydrates and fats was excessive. This imbalance may adversely affect both the health status and work productivity of the workers. Therefore, it is necessary to implement corrective measures to align the daily dietary intake of workers with established physiological standards.

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