Statistics of food quality as a factor in the dynamics of development of nutritionally dependent diseases in Russia

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Abstract. The article presents the results of quality control of basic food products. The growth of nutritionally dependent diseases has been demonstrated. The absence of a direct relationship between the growth of nutritionally dependent diseases and the increase in the population older than working age has been established. The emerging tendency of an increase in the mortality rate of the able-bodied population due to nutritional diseases has been identified. Economic measures to improve the quality of food products are proposed.

1. Introduction. The problem of ensuring the quality of basic food

The problem of public health in recent years has been more acute than ever. Doctors from all developed countries note the rapid “rejuvenation” of many chronic non-communicable diseases. The reasons for the changes are diverse. Specialists note the dependence of the development of diseases on the deterioration of the environmental situation, a decrease in physical activity, and increased stress. A special role in the development of a number of chronic noncommunicable diseases is played by nutrition.

![Figure 1. The structure of the manifestation of nutritionally dependent diseases in Russia.](image)

Rostokontrol performed a random check of a number of food products according to individual quality criteria (table 1).
Table 1. Test results of individual food products for compliance with safety requirements [1].

| Product name | The number of tested samples total | not meeting safety requirements | safety compliant | Including samples | Including (score on a 100-point scale) |
|--------------|-----------------------------------|---------------------------------|----------------|--------------------|--------------------------------------|
|              | Quantity, units | % | Quantity, units | % | Quantity, units | % | Quantity, units | % | Quantity, units | % | Quantity, units | % | Quantity, units | % |
| Milk         | 51                  | 33 | 65 | 18 | 35 | 48 | 100 | 88 | 60 | 90 | 73 | 56 | 82 | 65 |
| Meat         | 23                  | 17 | 74 | 6 | 26 | 54 | 86 | 78 | 65 | 100 | 89 | 52 | 66 | 58 |
| Minced meat  | 28                  | 12 | 43 | 16 | 57 | 19 | 83 | 64 | 60 | 90 | 73 | 50 | 71 | 59 |
| Poultry fillet | 28              | 16 | 57 | 12 | 43 | 42 | 77 | 65 | 70 | 85 | 77 | 52 | 57 | 53 |
| Frozen fish  | 32                  | 22 | 69 | 10 | 31 | 24 | 92 | 60 | 55 | 90 | 77 | 10 | 59 | 46 |
| White bread  | 23                  | 11 | 48 | 12 | 52 | 45 | 88 | 68 | 70 | 90 | 85 | 23 | 39 | 31 |
| Pasta        | 46                  | 44 | 96 | 2 | 4 | 74 | 94 | 92 | 70 | 94 | 86 | 12 | 59 | 51 |

Statistics of the morbidity of the population by the main classes of diseases indicate an increase in the density of nutritionally dependent diseases. The density of diseases on which the quality of nutrition does not affect, does not change significantly and even tends to decrease. Excerpts from the general table of the morbidity of the population, characterizing the formed trends in the dynamics of the density of diseases, are given in the table 2.

Table 2. The incidence of the population by certain classes of diseases in 2004 - 2018 (per 1000 people) [3].

| Disease classes                                      | Periods | Changes 2018 to 2004 |
|------------------------------------------------------|---------|----------------------|
|                                                      | 2004    | 2006    | 2008    | 2010    | 2012    | 2014    | 2016    | 2018    | Growth | Growth rate |
| Non-nutritional diseases                             | 38.5    | 37.2    | 36.3    | 32.8    | 32.1    | 30.8    | 27.9    | 27.0    | -11.5  | 70.1      |
| Infectious and parasitic diseases of the eye and adnexa | 34.2    | 35.7    | 34.0    | 33.0    | 35.2    | 34.7    | 32.6    | 31.4    | -2.8   | 91.8      |
| Diseases of the ear and mastoid process              | 24.0    | 24.5    | 24.7    | 27.1    | 28.2    | 27.7    | 26.3    | 25.5    | +1.5   | 106.3     |
| Alimentary diseases                                  | 9.6     | 9.9     | 10.1    | 10.8    | 11.6    | 11.6    | 11.4    | 11.6    | +2.0   | 120.8     |
| Neoplasms                                            | 9.8     | 11.7    | 11.4    | 10.2    | 10.6    | 11.2    | 13.9    | 13.1    | +3.3   | 133.7     |
| Endocrine, nutritional and metabolic                  | 22.0    | 26.5    | 26.5    | 26.1    | 26.6    | 28.8    | 31.7    | 32.6    | +10.6  | 148.2     |
| Circulatory system diseases                          |         |         |         |         |         |         |         |         |        |            |

The density of nutritional diseases does not seem to be quite high, however, given the fact that their number is growing steadily, there is concern that in the near future both the natural indicators of the number of cases and the relative ones per 1000 population may change significantly.

2. Results. Identification of the relationship between the working-age population and food quality
The quality of food consumed has a significant impact on the development of a number of diseases. According to the Federal Service for Supervision of Consumer Rights Protection and Human Well-being, the most important role is played by the nutrition factor in the origin and development of diseases such as cardiovascular disorders (61%), neoplasms (32%), and diabetes mellitus II type (non-insulin-dependent) (5%), nutritional deficiencies (iodine deficiency, iron deficiency, etc.) (2%) (figure 1) [2].
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Figure 2. Dynamics of the incidence of the population by certain classes of diseases in 2004 - 2018 (per 1000 people).

Comparison of the incidence rate with a step of only 15 years, conclusively proves that the danger of nutritionally dependent diseases lies in a calm "non-explosive" dynamics, allowing each subsequent generation to consider the existing number of unhealthy people as a normal phenomenon.

Most nutritional diseases are traditionally considered “age-related” diseases of the elderly. If the growth of nutritional diseases is associated primarily with an increase in the number of elderly people, then the growth rate of the relative incidence rate (per 1000 people) should change adequately to the increase in the share of elderly people in the total population.

The change in the age composition of the Russian population in recent years is characterized by a decrease in the share of the working population. Accordingly, the proportion of people younger and older than the able-bodied population is growing (table 3).

Table 3. The distribution of the population by age groups [4].

| Whole population | 2004   | 2006   | 2008   | 2010   | 2012   | 2014   | 2016   | 2018   | 2019   |
|------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Total            | 144134 | 143236 | 142748 | 142857 | 143056 | 143667 | 146545 | 146880 | 146781 |
| including:      |        |        |        |        |        |        |        |        |        |
| younger than able-bodied | 25136 | 23671 | 22842 | 23126 | 23568 | 24717 | 26360 | 27254 | 27430 |
| Share in total, % | 17.4   | 16.5   | 16.0   | 16.2   | 16.5   | 17.2   | 18.0   | 18.6   | 18.7   |
| able-bodied      | 89852  | 90157  | 89745  | 87983  | 87055  | 85162  | 84199  | 82264  | 81362  |
| Share in total, % | 62.3   | 63.0   | 62.9   | 61.6   | 60.9   | 59.3   | 57.5   | 56.0   | 55.4   |
| Older than able-bodied | 29346 | 29408 | 30161 | 31714 | 32433 | 33788 | 35986 | 37362 | 37989 |
| Share in total, % | 20.3   | 20.5   | 21.1   | 22.2   | 22.6   | 23.5   | 24.5   | 25.4   | 25.9   |

The proportion of elderly people has grown over the past 15 years by 25.1%. The density of nutritional diseases does not correlate with the increase in the proportion of elderly people and differs significantly depending on the type of disease itself.

Trends in the dynamics of morbidity indicate an increased susceptibility to diseases of the nutritional nature of the able-bodied population.
Atherosclerosis, hypertension, diabetes mellitus at the end of the last century (two to three decades ago) were characteristic of people of older, usually retirement age. All these diseases are increasingly being detected in relatively young people, having barely crossed the threshold of thirty years. Previously, complications of these ailments also make themselves felt.

To the greatest extent, “rejuvenation” affected the diseases of the circulatory system. Over the past decades, cardiovascular disease has noticeably grown younger. If earlier they were mainly found among pensioners, now even young people die from heart attacks and strokes. The diagnosis of vegetovascular dystonia is often made in adolescents or even children.

The “rejuvenation” of a number of diseases of an alimentary nature may adversely affect life expectancy in Russia. In order to study this issue, we analyzed data on the distribution of mortality by age groups over four decades (figure 3).

Figure 3. Dynamics of changes in the proportion of age groups in a number of studied cases of life expectancy.

The main “peak” of mortality occurs between 70 and 90 years. In recent years, the life expectancy of persons who have reached retirement age has been increasing. However, against this background, one can recognize the alarming trend in the growth of mortality among people of working age. In the period 1981 - 1990, the curve has a fairly smooth shape. The last two decades are characterized by the appearance of a slight increase in mortality among people aged 30-40 years. An analysis of the situation allows us to conclude that in the absence of military conflicts, criminal, and other social factors, the reason for this phenomenon lies in the early acquisition of diseases, the predominant part of which is nutritional in nature.

According to the Federal State Statistics Service 2017, the causes of early death of men and women are somewhat different. Neoplasms are recognized as the main cause of death of women in Russia. The second is occupied by diseases of the circulatory system. Third place causes that are independent of the state of health. The main cause of death for men are diseases of the circulatory system.

3. Discussion
The quality of food is one of the most important components of ensuring a long life and labor activity of the population. In order to stabilize and improve the unfavorable situation with nutritional diseases, it is necessary to carry out work in several directions at once [5].

Food safety is ensured not so much by prohibitive measures as by the recovery of the economy as a whole. Success in this area can only be achieved through economic methods of influence, carried out in harmony with a sufficient level of consumer awareness [6]. It is necessary to increase the requirements for manufacturers producing basic food products.

Organizations producing natural products without GMOs and food additives should be provided with state support up to the provision of subsidies from the budget. Small farming should be supported up to the provision of tax holidays for up to 10 years and interest-free loans [7].
4. Conclusion
Manufacturers are required to provide true information about the composition of the product. At the same time, the level of competence of citizens should be sufficient for the perception of the information received and its correct interpretation. As a result, an economic system should be created that stimulates the production of environmentally friendly and healthy products.

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