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Assessment of nutritional status and malnutrition among the elderly in Russia

BACHELOR'S THESIS

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Declaration

I hereby declare that I have done this thesis entitled ‘‘Assessment of nutritional status and malnutrition among the elderly in Russia’’ independently, all texts in this thesis are original, and all the sources have been quoted and acknowledged by means of complete references and according to Citation rules of the FTA.

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Shershukova Evgeniia

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Abstract

The elderly faces many problems of socio-economic and medical character. One of them is malnutrition. However, this problem is not actively reported and studied in many countries. In the Russian Federation, this problem is not widespread both in the academic community and at the state level. Therefore, this study aimed to assess the nutritional status and malnutrition among the elderly in Russia. The survey of 100 respondents was conducted using the following tools: Mini Nutritional Assessment – Long Form, the 7-days food diary, and Food Consumption Score.

The results from the MNA – LF revealed the following prevalence: 23 respondents showed normal nutritional status, 69 respondents registered risk of malnutrition and 8 respondents were malnourished. The 7-days food diary tool was used to detect eating habits among the elderly. The Food Consumption Score was also calculated to comprehend this problem more fully. The results showed that 74 elderly households were characterized by acceptable food consumption status, 22 elderly households were borderline, and 4 elderly households were poor in terms of food consumption status. This indicated that although predominantly elderly households were indicated to have a good food consumption status, they still can be at risk of malnutrition. To improve the situation for the elderly, the more balanced and nutritious food pattern was introduced based on the Institute of the Russian Academy of Medical Sciences and Russian gerontological scientific and clinical centre recommendations.

Key words: elderly malnutrition, gerodietary requirements, Russian elderly, gerontology, nutritional status.

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List of the abbreviations used in the thesis

AFI	–	Acute Food Insecurity
BMI	–	Body Mass Index
COVID	–	Coronavirus disease
FAO	–	The Food and Agriculture Organization of the United Nations
FCS	–	The Food Consumption Score
FL	–	Federal Law
IOM	–	The International Organization for Migration of the United Nations
IPC	–	Integrated Food Security Phase Classification
MNA – LF	–	Mini Nutritional Assessment – Long Form
NCD	–	Non-communicable disease
RHSE	–	The Russian High School of Economics
RIA	–	The Russian Information Agency
UK	–	The United Kingdom
UN	–	The United Nations
UNICEF	–	The United Nations International Children's Emergency Fund
USA	–	The United Stated of America
WB	–	The World Bank
WFP	–	The World Food Program of the United Nations
WHO	–	The World Health Organization of the United Nations
WMO	–	The World Meteorological Organization of the United Nations

1. Introduction

The world is undergoing transformational processes of a different nature, changing the paradigm of existence on the planet. Different variables, dynamics and results characterize these processes, but some transformational trends make it possible to realize even now what our planet will be like in the near the foreseeable future. Trends can affect various areas of human management – education, economics, healthcare, culture, industry and others, but they all form a synergistic tangle of interactions that will somehow determine the future of the human population. One such trend is the aging of the world's population.

According to the United Nations, the world's population is aging – by 2050, one in six people will be over age 65% (16%-of total population) (UN 2019). Moreover, globally the population aged 65 and over is growing faster than all other age groups. In this regard, healthcare and life support systems worldwide face a systematic request to provide this population group with socio-economic resources to improve their quality of life since it is the elderly who are one of the most vulnerable social groups among the population. Given the current transformation of human society and all areas of its functioning in accordance with the paradigm of sustainable development with the creation of Sustainable Development Goals, the United Nations also announced the initiation of the ''Decade of Healthy Ageing'' (2021-2030) (WHO 2020). This will allow, through collaboration between countries, international agencies, the private sector and other stakeholders, to improve the lives of older people on multiple levels.

The elderly, as a social category, is a somewhat vulnerable group that can be prone to various problems, both in the socio-economic spectrum and the physiological one; however, these problems are usually correlated with each other. One of the problems affecting different aspects of older people's lives is malnutrition. Moreover, poor nutrition and malnutrition are among the most pressing problems globally among all populations, including the elderly. In this regard, it is necessary to study the issue of malnutrition among the elderly and develop a range of comprehensive measures that will allow not only to focally improve the phenomenon of nutrition of the elderly at the global level, but also in a particular country or region (Neloska et al. 2016).

Based on the data of the UN (2019), the top-5 countries with the largest number of older adults include China, India, the USA, Japan and Russia. In the Russian Federation, as in the whole world, the aging of the population occurs, and this process will continue, at least until the middle of the 21st century. In Russia in 2022, there were almost 42 million people older than working age or 28.7% of the total population in the country, while in 23 regions of the country (out of 85), the share of persons older than working age is already almost a third of the population (Rosstat 2021). Currently, the Russian Federation approves a set of measures to improve the quality of life of citizens older than working age. Thus, the federal project ‘‘Elder generation’’, the concept of the demographic policy of the Russian Federation for the period until 2025, and the state program “Social Support of Citizens” is being implemented. The tasks of improving life expectancy and strengthening the health of the elderly population are laid down in the ‘‘Strategy of Acts in the interests of citizens of the older generation until 2025 in the Russian Federation’’ (Tkacheva 2019).

Nevertheless, the aging of the population in Russia is also associated with the presence of various problems of a socio-economic and medical nature. Such problems include loneliness, poverty, poor health status, and societal alienation. However, these problems can directly or indirectly affect the occurrence of another problem – malnutrition, being the cause or consequence of the above-mentioned problems. Malnutrition seems to be a pathological condition due to the inconsistency of the intake and flow of nutrients, leading to a decrease in body weight and a change in the component composition of the body, a reduction in physical and mental functioning, as well as worsen the prognosis of life (Sedova et al. 2019). Currently, in Russia, the problem of malnutrition among the elderly has not yet found wide publicity and study despite its presence and confirmation by medical society (Tkacheva 2021).

The study’s main aim was to investigate the nutritional status and interventions for improving nutrition among the elderly in Russia.

2. Literature Review

2.1. Defining the general paradigm of malnutrition

The human body is a complex mechanism, the vital activity of which is influenced by many factors. As Fortunka (2020) noted, these factors include environment, physiology, lifestyle, and other factors. Nutrition is also one of the factors, and, as Zavitsanou & Drigas (2021) mentioned, eating habits are crucial for human health. Moreover, nutrition plays a huge role in inhibiting or promoting diseases (Khan et al. 2018). Nutrition is linked with different conditions that can worsen a life of a human – malnutrition is one of them. Malnutrition is a pathological condition caused by a mismatch between the intake and consumption of nutrients. This leads to a decrease in body weight and a change in the body's composition, a decrease in physical and mental functioning, and a worse prognosis (Cederholm et al. 2017). However, the very definition of malnutrition is quite multifaceted, and therefore **Table 1** shows a selection of definitions for this term.

Table 1. Overview of definitions for ''Malnutrition''

Author (s)	Definition
Soeters (2008)	Malnutrition is a subacute or chronic state of nutrition in which undernutrition has led to a change in body composition and diminished function
Morley (2012)	Malnutrition can be considered a condition in which inadequate calories are delivered to the portal blood system, which is correctable either by correcting the cause or providing enteral or parental nutritional support
Krupenkina et al. (2017)	Malnutrition develops when there is insufficient volume and caloric intake of food

Siddiqui et al. (2020)	Malnutrition relates to a deficiency, excess, or imbalances of energy and other macro and micro-nutrients
Tkacheva et al. (2021)	Malnutrition is a condition that develops as a result of insufficient intake or absorption of food and components, leading to changes in body composition [loss of lean mass and active cell mass], a decrease in the level of physical functioning or cognitive functions, and a worsening of the clinical outcome of diseases
WHO (2021)	Malnutrition refers to deficiencies, excesses or imbalances in a person's intake of energy and/or nutrients

Malnutrition, as a phenomenon, is a polyetiological pathological condition with causes of different natures, including social, medical, economic and psycho-emotional. Causes of social nature include poverty, lack of food, reduced daily activity and social isolation (Besora-Moreno et al. 2020). Medical causes of malnutrition are numerous. Among them are lack of appetite, taking certain medications, previous prescription of a too strict diet, changes in taste and olfactory receptor apparatus, chewing problems, dysphagia, upper limb dysfunction, limited mobility, acute and chronic diseases/injuries occurring with an inflammatory reaction (Russian gerontological scientific and clinical center 2021). These causes also can contribute to catabolic processes (malignant neoplasm, chronic obstructive pulmonary diseases, congestive heart failure, chronic kidney disease), pain syndrome, and increased metabolism (pheochromocytoma, hyperthyroidism) (Tkacheva 2021). Regarding psycho-emotional causes, differentiate depression and impaired cognitive functions (Mokhber et al. 2011; Caldo-Silva et al. 2022). Moscow Geriatric Service (2019) also highlights economic reasons. Among them are lack of money or buying food is not a priority.

To understand this paradigm better, Monroy-Torres et al. (2021) also mentioned so called ‘‘The 6 P’s of malnutrition’’, presenting the six multidimensional main characteristics of malnutrition, including **P**roduction, **P**reservation, **P**opulation, **P**overty, **P**olitics and **P**athology. As one of the causes of malnutrition, production is connected mainly with agricultural and food production. In areas where the food production paradigm is disrupted due to various factors, malnutrition may occur. One of the examples is Somalia. According to WMO (2023), Somalia is facing a multi-year drought in 2023 in the Horn of Africa. This has led to the following consequences: lack of harvest, 7 million people being affected by drought, 7.7 million people needing humanitarian assistance (IOM 2022) and severe wasting in children – the deadliest form of malnutrition (ReliefWeb 2022).

Going to the preservation as the other determinant of malnutrition, Torres-León & Aguilar (2022) noted that it includes preserving food from wastage and loss with the help of food processing. FAO (2022) delivered criticism about the yearly food loss. It stated that the lost and wasted food could feed 1.26 billion hungry people yearly. Various techniques that can help with the improvement of preservation. As Torres-León et al. (2018) mentioned, these techniques include individual quick freezing, dehydration, and making jams, juices, and nectars. For example, Tanzania is known to have 30% of cereals and 70% fruits and vegetables lost yearly due to inappropriate handling, storage and processing (Asogwa et al. 2017). As a trigger for a change, the Tanzanian government 2018 implemented the ‘‘National Post-Harvest Management Strategy’’. According to this strategy, by 2027 the new agricultural reality will be established with reduced post-harvest losses along the commodity value chains (Ministry of Agriculture of Tanzania 2018), improving the population’s nutrition status.

The population also serves as an element in determining malnutrition, with the sub-factor as population density. The higherthe population density, the higher th the competition for food, limiting growth and fecundity (Benton 2012). This confirms Ricker-Gilbert et al. (2014) stating that it can also affect agricultural systems with the correlation of ‘‘higher population density – higher food prices’’. This will significantly reduce the resilience and well-being of society. Rapid population growth can contribute to malnutrition because agricultural systems cannot cope with the increasing demand. This cause was already evident in the late 1980s and was mentioned by Population Crisis Committee (1988).

Sheykhi (2019) agreed that a rapidly growing population could increase pressure on resources. Therefore the combination ‘‘population growth and population density’’ can lead to the bounce of malnutrition. The factors mentioned above put pressure on society creating a favorable situation for the occurrence of malnutrition among the population targeting the most insecure groups of people: children, pregnant and nursing females, elderly.

Poverty is one of the major causes and determinants of malnutrition. Based on WHO (2021), poor people are more likely to be involved in different forms of malnutrition. Siddiqui et al. (2020) observed that high levels of malnutrition are associated with areas dominated by poverty. Globally, the poverty headcount ratio at $2.15 a day persistently declined from 43.6% of the population in 1981 to 8.4% 2019 according to World Bank (2021). Despite this fact, poverty still exists, and Sub-Saharan Africa is the most affected by poverty region of the world (Broadberry & Gardner 2022). In general, it is not likely that Africa, especially the Sub-Saharan region, will accomplish SDG #1 – ‘‘End poverty in all its forms everywhere’’ by 2030. Based on the report ‘The state of food security and nutrition in the world’ (FAO 2022), the dynamics of the prevalence of undernourishment in Sub-Saharan Africa following millions of people]: 2005 – 23.9, 2010 – 18.9, 2015 – 18.3, 2020 – 22.7, 2021 – 23.2. The regions most affected by undernourishment in Sub-Saharan Africa are Eastern Africa (29.8 million of people in 2021) and Middle Africa (32.8 million of people in 2021). Moreover, in 2021 in Sub-Saharan Africa, severe food insecurity was 26.2%, and moderate or severe food insecurity in 2021 in the same region was 63.2%.

Politics can influence nutrition in the form of ideology, choices and actions. Given that malnutrition appears to be a complex and multidimensional phenomenon with many elements involved, policies and politics as one the levers for change can play a role in reducing malnutrition worldwide. Moreover, as FAO (2014) stated, ‘‘malnutrition calls for a political, multisectoral and coordinated response’’. Politics and its tools can make a big difference in nutrition and malnutrition (Walls et al. 2021).

2.2. Malnutrition in a medical sense

Regarding the medical character of malnutrition, the ‘‘pathology’’ determinant can serve as characteristics. It can refer to diseases that can cause a change in nutritional status. As Dipasquale (2020) mentioned, frequent infectious diseases, poor hygiene, and poor water quality can be the triggers of malnutrition that will also cause biochemical changes within the person. Moreover, malnutrition can lead to an increase in pathologic inflammation, which leads to the weakening of systems of the human organism (Patterson et al. 2022). These conditions, as Ensari (2014) and McCarroll et al. (2015) noted, are responsible for developing a malabsorption syndrome when the person cannot absorb nutrients from food.

Turning to the typology of malnutrition, WHO (2021) divided it into undernutrition (wasting, stunting, underweight), inadequate vitamins or minerals intake, overweight, obesity, and resulting diet-related non-communicable diseases. Beginning with undernutrition, the particular subtype ‘‘wasting’’ refers to acute malnutrition when the individual has insufficient weight for their height (Action against hunger 2022). UNICEF (2021) declared it as the most life-threatening form of malnutrition. One main reason for wasting is chronic nutrient deprivation (Ngwira et al. 2017). Subtypes ‘‘stunting’’ and ‘‘wasting’’ were introduced in the early 1970s by J. Waterlow (Briend et al. 2015) and were divided into two separate forms of malnutrition. Thurstans et al. (2021) argued that these subtypes were treated differently because of this decision, resulting in a disconnection within nutrition programs.

Uzogara (2016) in his research described that clinically underweight can be measured using BMI with the following formula: a person’s weight in kilograms divided by the height in meters squared (BMI = kg ÷ m^2). Uzogara (2016) mentioned that more than 40 major factors can contribute to the developing condition of being underweight. These factors can include gastrointestinal problems, immune system problems, environmental factors, age-related issues, and limited cultural, ethnic or religious foods available to choose. Poor diet and food intake are factors that can lead to being underweight (Wheeler et al. 2012). Lee et al. (2013) distinguished another problem that can contribute: difficulty chewing or swallowing, loss of teeth, gum and denture problems. Many underlying chronic diseases also lead to developing underweight condition (Kelly et al. 2008).

There is also a strong connection between depressive symptomatology and being underweight (Halem et al. 2017; Khanna & Aeri 2020; Ramos-Vera et al. 2022). Inadequate vitamin and mineral – nutrient – intake also is associated with malnutrition in terms of developing nutrient deficiencies. In the general case, it can increase the risk of acute infectious disease or death, as Yue et al. (2022) mentioned – contrast the adequate level of vitamins and minerals contributes to an individual's overall health. In terms of the classification of nutrients, discern macronutrients and micronutrients. Macronutrients consist of fats, proteins and carbohydrates that, as Venn (2020) mentioned, are essential to sustain life. Micronutrients show a big impact on people. Höller et al. (2018) noted that micronutrients are needed at every stage of life, and their deficiencies can induce deterioration of the quality of life. The mechanism of developing micronutrient deficiencies is presented in **Figure 1**.

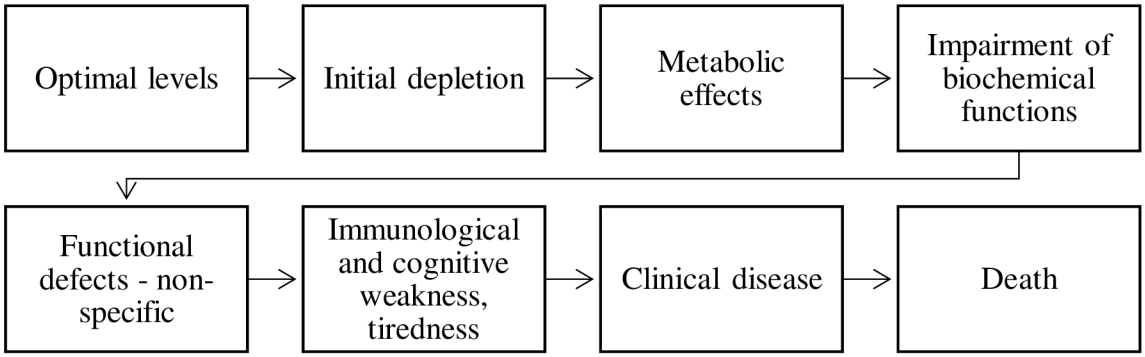

Figure 1. Development of micronutrient deficiency

Source: adapted from Shenkin (2006)

Santander et al. (2021) differentiate two main groups of micronutrients: organic (vitamins) including water-soluble (vitamins of the B group [B1, B2, B3, B6 and B12] and C) and fat-soluble (vitamins A, D, E and K), as well as inorganic comprising macroelements, trace elements and ultra-trace elements. To macroelements contribute Na, K, Ca, P, Mg, Cl and S, to trace elements – Fe, F, I, Mn, Co, Cu and Zn, to ultra-trace elements – Si, Ni, Cr, Li, Mo and Se. Regarding common nutrient deficiencies, Hendricks et al. (2016) and Singh & Bharti (2021) mentioned protein, vitamins A, B, C and D, calcium, folate, iodine, iron and zinc deficiencies. WHO (2021) adds that deficiencies in iron, vitamin A and iodine are the most common around the globe.

Nutrient deficiencies are connected to the phenomenon of ‘‘Hidden hunger’’. Based on the research of Lowe (2021) multiple micronutrient deficiencies exist – notably iron, zinc, iodine and vitamin A. Hidden hunger is associated mainly with undernutrition. Obesity and being overweight go hand in hand together. According to WHO (2021), these health conditions are defined as abnormal or excessive fat accumulation that can negatively affect health. BMI can detect these nutritional anomalies. BMI is an index of weight-for-height that is used for the classification of obesity. BMI classification is presented in **Table 2**.

Table 2. Classification of BMI

BMI	Classification
< 18.5	Underweight
18.5–24.9	Normal weight
25.0–29.9	Overweight
30.0–34.9	Class I obesity
35.0–39.9	Class II obesity
≥ 40.0	Class III obesity

Source: Uddin (2010)

Based on the data from World Obesity Day in 2022 (WHO 2022), more than one billion people worldwide are obese: 650 million adults, 340 million adolescents and 39 million children. World Obesity Atlas (2022) also showed that in the upcoming years, adults in the following countries will be in the top-10 in terms of obesity, which can be viewed in **Table 3**.

Table 3. The estimated prevalence of obesity (BMI ≥ 30kg/m^2) among men and women by 2030, numbers in millions

Women			Men		
Country	**Prevalence, %**	**Number**	**Country**	**Prevalence, %**	**Number**
USA	47	64	USA	47	61
China	10	60	China	10	55
India	8	40	India	4	24
Brazil	33	29	Brazil	26	21
Mexico	41	21	Mexico	32	15
Egypt	52	18	Russia	24	12
Russia	30	18	Egypt	31	11
Turkey	50	16	Turkey	34	11
Indonesia	14	14	Germany	32	10
Iran	42	14	UK	37	10

Source: World Obesity Atlas (2022)

As a result of growing health concerns related with the weight it is projected by World Obesity Atlas (2022) that by 2030 1 in 5 women and 1 in 7 men will be obese. Although the countries mentioned above has the highest number of obese people, Oceania Islands (the Cook Islands, Samoa, Tonga, Nauru, Palau, Niue, and the Marshall Islands) have the highest propensity of obesity. The least obese countries based on World Obesity Atlas (2022) are Timor-Leste, North Korea, Burundi, Myanmar, Afghanistan, Cambodia, Japan, Nepal, Laos and Bangladesh.

The last type is non-communicable diseases that have a close relation with malnutrition. An unhealthy diet and an unhealthy lifestyle can be the predominant cause of type II diabetes, cardiovascular disease and stroke, and some cancers (NCD Alliance 2020). WHO (2022) confirms that tobacco use, physical inactivity, excessive alcohol intake and unhealthy diet are increasing the possibility of getting the non-communicable disease and even dying from them. Rajamanickam et al. (2020), based on their research, found out that malnutrition alters biochemical composition in an individual, especially pancreatic hormone, resulting in increased risk for more severe type II diabetes. Considering the relation between malnutrition and cardiovascular diseases, malnutrition can negatively affect the cardiovascular system by increasing the risk of developing cardiomyopathy, heart failure, cardiac arrhythmia and even sudden death in children (Eroğlu 2019).

Speaking further, malnutrition is common among cancer patients combined from anorexia and metabolic dysregulation. Cancer-related malnutrition is not starvation-related, as Muscaritoli et al. (2021) mentioned. Evident malnutrition among pancreatic cancer patients resulting in severe weight loss and anorexia (Santos et al. 2021).

2.3. Elderly malnutrition

During the second half of the 20th century and the beginning of the 21st century, humanity experienced a significant increase in the population's life expectancy compared to previous centuries. This is due to an improvement in the quality of medical care, an increase in living standards, a decrease in the number of social problems and other factors. In this regard, one of the demographic trends of the 21st century is the increase in the number of elderly. In scientific terms, ‘‘elderly’’ refers to a person 65 years or older (Orimo et al. 2006). Philosophical understanding of old age and aging becomes relevant in the context of global and large-scale changes in the socio-demographic nature. Globalization raises issues of the social sphere and social policy to the supranational level and requires attracting the world community's attention tosolve the problem of population ageing.

Old age is one of the most challenging periods of a person’s life path. At this age, a severe personality transformation occurs. With age-related changes in the human life span, various processes occur in the human body. For the most part, with age, the number of negative manifestations in human health increases, which can lead to various diseases. This situation can stress the health care system worldwide, given that the number of older people is increasing yearly (WB 2021) (see **Figure 2**).

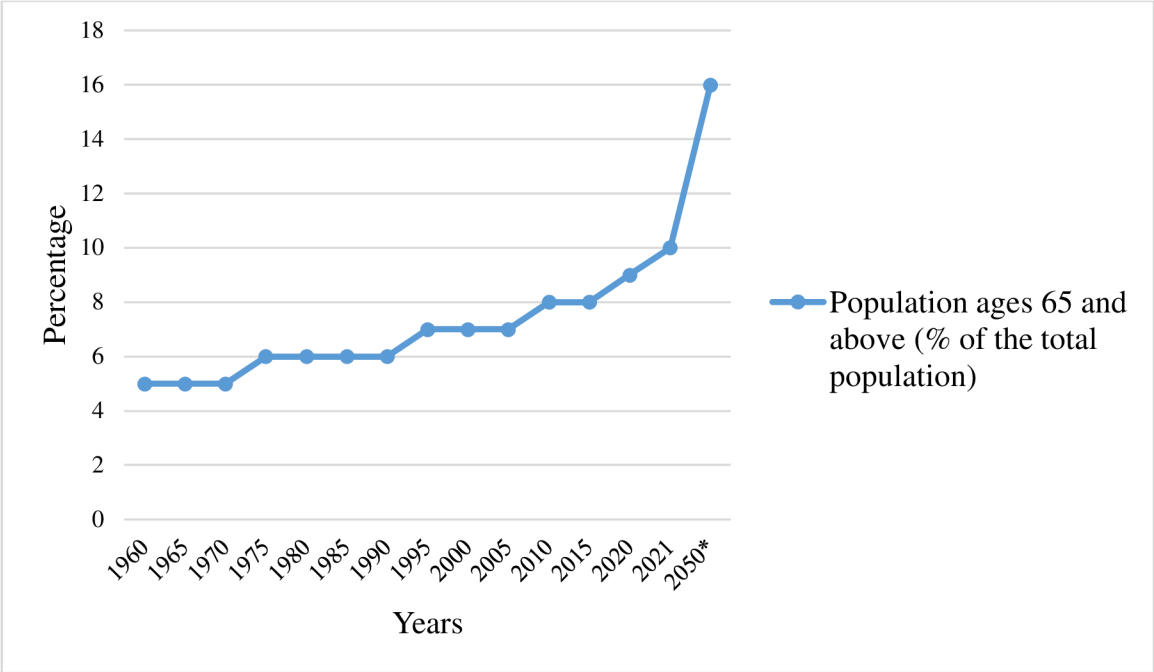

Figure 2. Population ages 65 and above, % of the total population. * – forecast

Source: World Bank (2021)

The health of the elderly is characterized by a different set of phenotypic and physiological characteristics, taking the form of so-called age-related conditions or geriatric syndromes. The term ‘‘geriatric syndrome’’ describes a group of common health conditions in older people that do not fit into discrete disease categories (Lafreniere & Jassal 2019). Geriatric syndromes are multifactorial conditions that form in response to decreased functioning of many organs and systems. Despite their heterogeneity, geriatric syndromes share many common features (Sedova et al. 2019). Magnuson et al. (2019) mentioned that these features are cognitive impairment, delirium, depression, and polypharmacy. Balducci (2014) also noted the presence of dementia, vertigo, falls and spontaneous bone fractures. Further, in this research, the aspect will be placed on malnutrition among the elderly.

Nutrition is an important factor in determining the health and well-being of older people. Nutrition, as a socio-cultural and physiological paradigm, is in the lens of researchers worldwide, influencing not only at the local or regional but also global levels. However, nutrition, correlated with food security and sustainable development (Ruel 2013), is characterized by various problems, and improving this phenomenon is one of the global priorities.

That is why in 2015, the United Nations created seventeen Sustainable Development Goals, where goal #2 is ‘‘Zero hunger’’, and specifically #2.2 is ‘‘End all forms of malnutrition’’ (The Global Goals 2015). Improper nutrition contributes to the progression of many diseases and is considered one of the important links for diagnosing geriatric syndromes. Elderly and senile people often have a reduced level of food intake due to various reasons (Pilgrim et al. 2015), as a result of which this category has an increased risk of malnutrition. There has been a strong association between malnutrition and poor outcomes in the elderly – increased rates of infections and stress ulcers, more extended hospital stays and readmissions, prolonged recovery from respiratory infections, increased risk of fractures, increased mortality, and decreased quality of life (Neloska et al. 2016). Talking about elderly malnutrition, we can say that two prevailing types occur among elderly with this condition, which can be seen in **Table 4**.

Table 4. Prevailing types of elderly malnutrition

Types of malnutrition	Disease	Deficiency
Protein-energy malnutrition	Kwashiorkor	Protein
	Marasmus	Protein
Dietary: Vitamins and minerals (micronutrient deficiencies)	Osteoporosis Rickets Tetany	Calcium
	Goiter	Iodine deficiency
	Keshan	Selenuim
	Anemia	Iron
	Growth retardation	Zinc
	Beriberi	Thiamine (Vitamin B_1)
	Pellagra	Niacin (Vitamin B_3)
	Scurvy	Vitamin C
	Osteoporosis Rickets	Vitamin D

Source: Younis et al. (2015)

Of these two prevailing types of malnutrition among the elderly, protein-energy malnutrition is the predominant type, as noted by Mathewson et al. (2021) and Nakade & Kondo (2020). However, Norman et al. (2021) and Schuetz et al. (2021) also noted disease-related malnutrition. In this research, the emphasis will only be on protein-energy malnutrition and dietary malnutrition.

2.3.1. Causes of elderly malnutrition

To facilitate understanding of the causes of malnutrition in the elderly population, (Morley & Silver 1995) also suggested the following formula presented in **Table 5**.

Table 5. ‘‘Meals on Wheels’’. Common causes of malnutrition in elderly

Medications	**O**ral factors	**W**andering and other dementia-related behaviors
Emotion [i.e. depression]	**N**o money, nosocomial infections	**H**yperthyroidism, Hyperparathyroidism, Hypoadrenalism, Hyperglecemia
Anorexia [nervosa or tardive], Alcoholism, Abuse		**E**ntry problems/Malabsorption
Late-life paranoia or alcoholism		**E**ating problems [severe tremor, stroke, weakness]
Swallowing disorders		**L**ow-salt or low-cholesterol diet
		Shopping and food prep problems, stores

Source: Morley & Silver (1995)

Oral problems can often be one reason for initiating malnutrition behaviors (Dion et al. 2007). In this regard, the DENTAL test may help, which can give an idea of whether there are oral factors that may interfere with proper nutritional intake (Morley & Silver 1995):

1. **D**ry mouth.
2. **E**ating difficulty.
3. **N**o recent dental care (within two years).
4. **T**ooth or mouth main.
5. **A**lterations or change in food selection.
6. **L**esions, sores, or lumps in the mouth.

Kossioni (2018) also mentioned that such dental problems as tooth loss might restrict dietary choices. This can start a ‘‘vicious cycle of malnutrition’’. Algra et al. (2021) agree on that point, declaring that poor oral health is one of the main reason for causing a negative impact on nutritional intake among the elderly. Khoury et al. (2022) stated that problems with oral health in the elderly ould cause avoidance of certain foods (predominantly hard to chew) that inevitably results in malnutrition.

The consequences of malnutrition are numerous and serious. They are in charge of changes in different human life support systems. In terms of respiratory systems, malnutrition cause a tremendous impact on respiratory functions (Ghignone & Quintin 1986), including reduced respiratory muscle strength, alterations of lung parenchyma and depressed lung defense mechanism (Ferrari-Baliviera et al. 1989). Malnutrition also negatively affects cardiovascular and blood systems, including problems such as cardiomyopathy, heart failure and cardiac arrhythmia (Eroğlu 2019), leukopenia, bone marrow hypoplasia and anaemia (Filippo et al. 2016). The gastrointestinal tract also suffers from malnutrition, among other human life support systems. The consequences attribute atrophy of the intestinal mucosa and decreased stomach acidity, which will lead to poor absorption of nutrients from food (Shaw et al. 2012; Mukherjee & Nagarsheth 2015). Due to malnutrition, the immune system suffers from suppression of cellular and humoral immunity (Bourke et al. 2016) and recurrent infections and chronic inflammation (Alwaraweah et al. 2018).

Skin is affected by atrophy, edema, increased friability and risk of bedsores (Frison et al. 2015), whereas the skeletal system reacts at malnutrition in the form of a decrease in bone density and occurrence of osteoporotic fracture (Rizzoli & Bonjour 1999; Kueper et al. 2015), and urinary system due to malnutrition suffers from urinary tract infections (Carlsson et al. 2013). Protein malnutrition with muscle wasting, respiratory failure, and cardiac dysfunction leads to reduced physical activity in the elderly in daily life, dependency on outside help, and loss of autonomy (Tkacheva et al. 2022; Owens 2018). A vicious circle is created, resulting from which social isolation leads to the worsening of malnutrition with an increased risk of infectious complications, an increase in the duration of illness, and the frequency and duration of hospitalizations. One of the consequences may be the development of the "senile asthenia" syndrome, which is associated with an increased risk of catastrophic deterioration in the health of older people. There is a defeat of many organs and systems of the body; the reserve capacity is gradually reduced (Proschaev et al. 2013).

2.4. Food insecurity as an element of malnutrition

The paradigm of nutrition and food is one of the most important for maintaining human health and well-being at the household level and globally. However, there are still problems in the world with maintaining human well-being regarding food, which directly affects the concept of food security. Food insecurity can arise when no synergy exists between food security and nutrition. In general terms, the most well-known definition of food security was provided by FAO in 2003. According to FAO (2003), food security is a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy lifestyle. Food insecurity, on contrary, does not meet the expectations mentioned above.

As a sophisticated concept, food security comprises four main elements – key dimensions: availability, access, stability and utilization (Gibson 2012). Peng & Berry (2018) define availability as when food can be produced locally or imported from abroad. Gibson (2012) explainsof the second dimension of food security. Access is when the state when people have both physical and economic access to food.

According to FAO (2008), stability is when the physical availability of food, economic and physical access to food and food utilization are aligned within the time. Food utilization happens when the body absorbs most of thenutrients in the food, as Aberman & Tirado (2014) noted. Food insecurity can occur when one or more dimensions cannot be fulfilled. According to FAO (2008), the concept of ‘‘food insecurity’’ is divided into three main categories: chronic, transitory, and seasonal. The main characteristics of chronic food insecurities are: a long-term, extended period of poverty, people are unable to meet their minimum food requirements over a continuous period. Transitory food insecurity, as Alem (2013) stated, concludes the following characteristics: short-term, an abrupt drop in the ability to produce enough food to maintain a positive nutritional status, and unpredictability. It is a relatively more dangerous occurrence because of its unpredictability. Some events can cause the strike of transitory food insecurity. One such event was COVID-19 which disrupted food chains and global food logistics resulting in the rise of transitory food insecurity in some countries, such as for example, Nigeria. Abdul (2020) stated that the spread of COVID-19 closed many businesses, increased food prices and slowed agricultural production putting many households into the transitory food insecurity stage. Seasonal food insecurity might happen in a gap between chronic and transitory food insecurity.

FAO (2008) developed the Integrated Food Security Phase Classification – Acute Food Insecurity Scale. This classification divides countries based on the presence of food crisis indicating them with a certain color scheme. AFI comprises five major levels that are presented in **Table 6** (IPC 2022).

Table 6. The Acute Food Insecurity Scale

Phase		Description
None/minimal	Phase 1	Availability of essential food and non-food needs. Easiness to acquire food for households
Stressed	Phase 2	Minimally adequate food consumption. Inability to afford some non-food needs without stress-coping strategies
Crisis	Phase 3	– Households have either food consumption gaps with the connection to high or acute malnutrition – Households can meet minimum food needs at the expenses of essential livelihood assets
Emergency	Phase 4	– Households have either significant food consumption gaps with the connection of acute malnutrition or excess mortality – Households can cope with the food gaps at the expenses of essential livelihood assets liquidation
Catastrophe/Famine	Phase 5	Extreme lack of food and other basic needs. Excessive levels of acute malnutrition and mortality

Source: IPC (2022)

2.5. Elderly in Russia

2.5.1. Socio-economic situation

Demography in the socio-economic sense in the Russian Federation is associated with the main socio-demographic groups of the population. Among them are the following (Government of the Russian Federation 2021):

1. Working-age population – persons aged 16 years and up to the age giving the right to an old-age insurance pension, with the exception of non-working disabled people of this age.
2. Pensioners (elderly) – persons who have reached the age that gives the right to an old-age insurance pension, as well as non-working disabled people.
3. Children aged 0 – 15 years.

As Polyakov (2012) and Soboleva et al. (2016) stated, economic and socio-political transformations in Russia over the past decade have significantly affected the socio-demographic situation in the country.

It is with the reforms carried out in the country that the processes of the population's quantitative, qualitative, structural and geographical movement, as well as changes in the economic situation, production motivation, and general attitudes and aspirations of influential groups, are associated. In Russia nowadays there is tendency towards a gradual increase in the number of pensioners (see **Figure 3**). Moreover, Russia is in the top-5 countries regarding the number of elderly people (UN 2022).

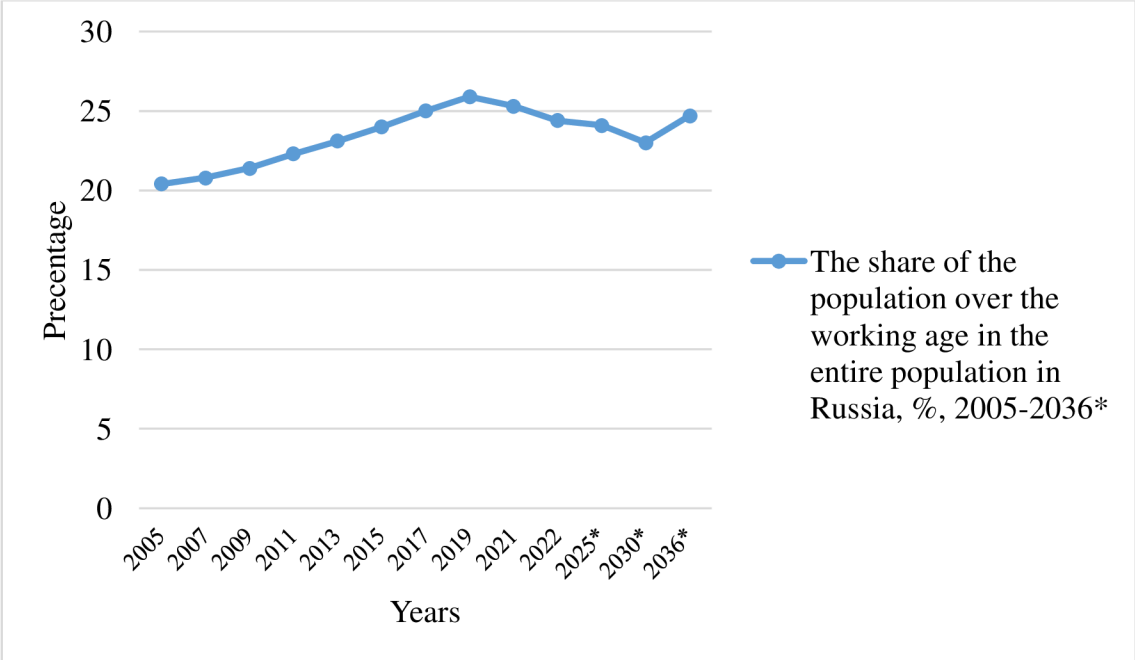

Figure 3. The share of the population over the working age in the entire population in the Russian Federation, %, 2005-2036*, * – forecast

Source: Federal State Statistics Service (2022)

Citizens of the older generation are carriers of knowledge and experience (Borsukovskiy 2011). They significantly contribute to the total intellectual potential and the socio-economic development of the Russian Federation (Sapoznikova 2015). They strive to work and are the creators of a significant part of material wealth. The elderly in Russia tend to actively participate in social development, preserve and increase the richness of culture countries and pass it on to younger generations, act as custodians of the most important spiritual and moral values and ensure communication and solidarity between generations (Sonina & Kolosnitsyna 2015).

It is worth emphasizing that in Russia, the concept of an elderly person is closely linked by socio-economic and cultural elements with the concepts of 'pensioner' and ''working age''. Pensioner (elderly) – a person who receives a monthly cash payment (pension), in particular, to compensate for wages and other payments and remunerations lost due to incapacity for work due to old age or disability. Working-age population – persons aged 16 years and up to the age of entitlement to the old-age insurance pension (Oseev 2022).

In Russia, there is a system of compulsory pension insurance, and pensions are guaranteed to all country citizens. The pension system of Russia in its modern form was introduced on January 1, 2015, and includes relations for the formation, appointment and payment of two types of pensions according to Russian law (ConsultantPlus 2018). According to Girich and Tsechoev (2019), the first and main type is insurance pensions, which are received by most pensioners in Russia. The right to such a pension arises from the payment of insurance contributions to the mandatory pension insurance system over a certain period. The main payment source for these pensions is funds generated from the said insurance premiums. The second type includes state pensions, which are paid at the expense of the federal budget (Bondarenko & Nevodova 2017). These pensions are outside the mandatory pension insurance system. The right to these pensions does not arise since during the period of work or other activities, mandatory pension insurance contributions were deducted for the corresponding citizen, but due to other circumstances specified in Federal Law of the Russian Federation (2001).

Researchers such as Skvortsova (2016), Gorlin et al. (2018) and Karneeva (2019) noted that the group of older people in the second decade of the 21st century in Russia also is affected by the new pension reform of 2019-2028. The pension system in the Russian Federation nowadays change. The main change is the increase of retirement age from 55 to 60 years for women and from 60 to 65 for men (ConsultantPlus 2018). Staurskiy & Golubchikov (2022) mentioned that the government's decision to raise the retirement age was unprecedented in nearly ninety years of Soviet and post-Soviet history. As declared by Norenkov (2016), it was caused by a decrease in the birth rate and an increase in life expectancy.

Currently, raising the retirement age due to population aging is a global trend and occurs in many states. According to the forecast of the Federal State Statistics Service of the Russian Federation, in 2035, there will be 391 pensioners per thousand working Russians, and without the reform, this number would be estimated at 553 (Starostina 2019). Part of the funds released during the pension reform will have to be directed to implementing national projects in various areas, including overcoming demographic crisis. In the Russian Federation, caring for elderly citizens is one of the state's priorities. The solution to issues related to maintaining the health of older citizens, social and psychological well-being and material well-being is carried out within the framework of the Action Plan for 2021-2025 adopted in 2021 by the Government of the Russian Federation. One of the main parts of this plan is the federal project ''Older Generation''. This program and other regional programs aim to increase the active longevity and healthy life expectancy of the elderly in Russia (Government of the Russian Federation 2016).

One of the economic aspects of caring for the elderly in the state is their financial support. The main mechanism for ensuring the guarantee of income for elderly citizens is pension provision. In this regard, it is necessary to consider the number of pensioners in the Russian Federation (see **Table 7**).

Table 7. Number of pensioners registered in the Pension Fund of the Russian Federation system, 2013-2022

Year	Number of pensioners registered in the system of the Pension Fund (thousands of people)
2013	40573
2014	41019
2015	41456
2016	42729
2017	43177
2018	43504
2019	43865
2020	43546
2021	42977
2022	42007

Source: Federal State Statistics Service (2022)

The state's ongoing social policy aims to increase pension provision. The state, within the framework of the legislation of the Russian Federation, takes appropriate measures to improve the financial situation of pensioners. It is also necessary to trace how the average pension for pensioners has changed considering the average minimum subsistence level (see **Table 8**).

Table 8. The average pension and minimum subsistence level for pensioners in the Russian Federation, 2013-2022

Year	The average pension of pensioners registered in the system of the Pension Fund of the Russian Federation, rubles/dollars	The average minimum subsistence level for pensioners, rubles
2013	9143.6 (1$ – 30.3 rubles average annual)	6097
2014	10029.7 (1$ – 38.4 rubles average annual)	6308
2015	10888.7 (1$ – 61.8 rubles average annual)	7916
2016	12080.9 (1$ – 76.3 rubles average annual)	8025
2017	12425.6 (1$ – 59.9 rubles average annual)	8178
2018	13232.1 (1$ – 56.7 rubles average annual)	8269
2019	14102.1 (1$ –67.3 rubles average annual)	8864
2020	14904.4 (1$ – 61.7 rubles average annual)	8944
2021	15744.6 (1$ – 74.2 rubles average annual)	10022
2022	16884.1 (1$ – 75.8 rubles average annual)	10882

Source: Federal State Statistics Service 2022; Audit.ru 2023

According to Kozina & Gerasimova (2018), an important component of the formation of incomes of elderly are legislatively fixed measures of social support – benefits and additional payments related to pensions, benefits and social services. The basis for their provision is that the citizen belongs to one or another category endowed with a special legal status. Thus, for elderly people from among the federal beneficiaries (veterans, disabled people, citizens exposed to Chernobyl radiation), a monthly cash payment is established and state social assistance is provided as a set of social services as Gorbunova et al. (2017) mentioned. At the federal budget's expense, privileged citizens are provided with social support measures for housing and utilities (Government of the Russian Federation 2016).

To support the elderly population of Russia, the parameter of social services for pensioners is also important. Regions of the Russian Federation, exercising the powers for social services to the population, constantly improve the practice of providing social services, expand the range of social services provided for the elderly and introduce into work with the population of new social technologies (Bogatenko et al. 2020). In 2021, all constituent entities of the Russian Federation continued to implement the regional programs adopted in 2019 as part of the ''Older Generation'' federal project aimed at improving health, increasing the period of active longevity and healthy life expectancy of older citizens (Sevastyanova et al. 2021). Regional programs as a part of this federal project are focused on the introduction of new technologies in the field of health care, social protection, promotion of a healthy lifestyle for elderly, strengthening social communications, organizing the educational process in the ''third age'', including in the period of preparation for retirement (Karneeva et al. 2019). This project acts also as a part of the ''Silver economy'' as Kolomiets (2018) mentioned. According to this ''Silver'' approach it seeks to integrate and build activities to promote active and healthy aging that improve the socio-economic situation of the elderly.

Nowadays, in Russia, exemptions are one of the most important socio-economic tools to improve the livelihood of the elderly. All of them are government initiated by law and exist in the form of material assistance or exemption from any mandatory payments for people receiving a pension for age, disability, or other reasons (RIA News 2021).

There are several types of exemptions. For example, based on Federal Law №5-FL (1995), veterans are entitled to tax breaks, compensation for housing and communal services and dental prosthetics, the manufacture of prostheses and orthopedic products, free travel in public transport, medical benefits, social cash payments, and discounts on utilities. This law is meant for the elderly that was the part of the Eastern Front in World War II. A slightly different situation for the elderly that have some form of disability. There are three forms of disability in Russia and three ways of assigning exemptions based on the Order of the Ministry of Labor and Social Protection of the Russian Federation №1024n (2015) and Federal Law №181-FL (1995). This can be viewed in **Table 9**.

Table 9. Disability groups and exemptions forms in the Russian Federation

Disability group	Disability group characteristics	Exemption forms
I	Impairment of human health with IV degree of severity of persistent violations of the functions of the human body (in the range from 90% to 100%) due to diseases, consequences of injuries or defects	Provision of free medicines and free individual medical products. Free prosthetics, orthopedic shoes, free public transport, 50% compensation for utility bills. Vouchers for the health sanatorium are also provided at least once a year. They are exempt from property tax
II	Impairment of human health with III degree of severity of persistent violations of the functions of the human body (in the range from 70% to 80%), due to diseases, consequences of injuries or defects	Partial provision of medicines and individual medical products. Free prosthetics, orthopedic shoes, free public transport, 50% compensation for utility bills. Vouchers for health sanatorium are also provided at least once a year. They are exempt from property tax
III	Impairment of human health with II degree of severity of persistent violations of the functions of the human body (in the range from 40% to 60%), due to diseases, consequences of injuries or defects	Compensation for part of the costs of paying utility bills, a 50% discount on medicines and orthopedic shoes. 50% discount on round trips by rail, air, road, river or sea transport once a year from September 1 to May 15

Source: Order of the Ministry of Labor and Social Protection of the Russian Federation №1024n 2015; Federal Law №181-FL 1995

One of the biggest elderly groups in Russia is police and retired army elderly. They also have special offers from the Russian government to improve their social-economic status. All of these measures are stated in the Russian Tax Code (1998), in Federal Law №342-FL (2011) and Federal Law №227-FL (2016). All of the exemption measures can be viewed in **Table 10**.

Table 10. Exemptions for the police and army retired elderly in the Russian Federation

Police retired elderly	Army retired elderly
Lump sum state payments in addition to pension money, cash salary according to rank, compensation for unused vacation, free treatment in medical institutions of the Ministry of the Interior, tax benefits. In addition, they can also qualify for reduced utility bills, preferential dentures, and free travel on public transport	There is no need to pay property tax, exempt from paying income tax for material assistance and gifts. They also receive a money pension supplement, free travel on public transport, reduced-cost fabrication and repair of dentures, discounts on utility bills and medical treatment. In addition, they can apply for free housing from the state

Source: Russian Tax Code 1998; №342-FL 2011; №227-FL 2016

Another three types of exemption are exemptions for lonely elderly who do not have any other family members, elderly that are 70+ years of age, and elderly that are 80+ years of age. These exemptions are based on Federal Law №178-FL (1999) and Federal Law №166-FL (2001). All of these exemptions are stated in **Table 11**.

Table 11. Exemptions for the lonely elderly, 70+ years of age elderly and 80+ years of age elderly in the Russian Federation

Lonely elderly	70+ years of age elderly	80+ years of age elderly
Depending on the region of residence, lonely elderly can undergo free medical examinations, vaccinations, and dental prosthetics. They can also qualify for discounts on the purchase of medicines, free vouchers for treatment in a sanatorium. In addition, the state provides them with benefits for paying utility bills, in the tax area, free travel on municipal transport, exemption from paying garbage collection service and some other social assistance tools	Depending on the region of residence, elderly in this category can use discounts on utility bills, land, property and transport taxes. In addition, they can be provided with free medicines, as well as free use of public transport	Depending on the region of residence, elderly in this category are exempted from capital repair fees, and they also receive a 100% increase in their old-age pension based on their existing pension. They have access to benefits for prosthetics, transportation, and utility bills. They have access to free treatment in a sanatorium twice a year, as well as service in hospitals and clinics without a queue

Source: №178-FL 1999; №166-FL 2001

In general, all socio-economic bonuses from the state depend on the region where the elderly live since, for example, in Moscow, there will be more benefits and an average pension, while in the Magadan Region, one of the poorest and most remote from the center, benefits will vary, as will the size of the pension. Despite the general rules, pensioners must still apply to regional centers for social and economic instruments to support their livelihood.

2.5.2. Health and nutrition

The health of elderly in Russia is a rather controversial phenomenon because this indicator is not studied systematically and being more present in the samples of the Ministry of Health, which are not systematically released. Moreover, confirming this, one can cite the example of a statistical compendium dedicated to presenting data on the healthcare system in Russia, which is published every two years (Federal State Statistics Service 2021). This statistical compilation does not have a separate tab dedicated to the health of the elderly population since the state aims to study this indicator only in the context of children and the working-age population.

Based on the statistics of the Ministry of Health (2019), the Russian elderly began to get sick more often – in 2017, there were 198.132 diseases per 100.000 of the population older than working age (from 55 years old for women and from 60 years old for men), then in 2018 this figure increased to 202.603. The most common diseases among elderly are cardiovascular diseases. Most deaths are recorded as a result of this type of disease. Older people are most often faced with cancer, diabetes, dementia and diseases of the musculoskeletal system. Shlafner (2021) noted that many primary diseases appear in old age. In 2015-2020, the greatest increase in primary morbidity of the entire population of retirement age was noted due to diseases of the circulatory system, some infectious and parasitic diseases, diseases of the blood, blood-forming organs and individual disorders involving the immune mechanism, the endocrine system, eating disorders and metabolic disorders, respiratory organs, neoplasms, mental and behavioral disorders. For 2015-2020, the primary morbidity rate of the population older than working age increased from 52311.38 to 52381.7 per 100 thousand of the total population of the corresponding age. This reality poses a problem for the healthcare system in Russia.

Different incidence rates are associated with population density, as well as the characteristics of the territory and regional health care. Sizova & Sagitova (2019) noted to assess the state of health, including the determination of the health group and the dispensary observation group, a medical examination of the adult population has been carried out since 2013. This includes preventive medical examination and additional examination methods (Yakovleva et al. 2014). Based on Order of the Ministry of Health №404n (2021), medical examination of the adult population is carried out in two stages. The first stage is a clinical examination (screening). The main purpose is to identify signs of chronic non-communicable diseases, risk factors for their development, major risks for health, and determine the health group. According to Golkov (2017) is about conducting various medical tests to confirm hypothetical diagnoses and further treatment or correction.

Health is a multidimensional phenomenon consisting of physiological and mental-related problems that can affect person's nutritional status. One of the widespread mental-related problems among the Russian elderly is depression. Predominantly elderly in Russia suffers depression as a consequence of loneliness and ''invisibility''.

Shamina (2017) named Russian elderly ‘‘invisible people’’ because often they are excluded from the society life. Guryanov (2020) named this problem as ‘‘one hundred troubles of loneliness’’. Often in Russia the old age – 65+ – is called ‘‘the age of dragging existence’’ based on the data from All-Russian Center for the Study of Public Opinion (2017). Elderly loneliness can cause dreadful problems. Off and on in the media, there are news about deceased elderly who were found in their apartment even after months after the death. In Russia, around 7 million elderly are living alone, posing a problem for society, as they feel excluded (Guryanov 2020). As Melchinko et al. (2022) mentioned, there are five predominant causes of elderly loneliness. Among them are reduction in the circle of interests and hobbies, changes in character, mental problems, problems with the family and reduction in the circle of old friends. This also affects the type of aging of the elderly population in Russia from the point of view of socio-psychology. According to Rimashevskaya & Dobrochleb (2013), the type of aging in Russia is socio-pathological. This implies a low level of social involvement in society, a low level of state interest in the elderly, as well as the fading of interest in life on the part of the elderly themselves.

The problem that unites older people’s health and nutritional status is that these paradigms are practically not explored at the state level in Russia. It is extremely rare that social studies appear that study the problem of the loneliness of Russian elderly, or the parameters of their nutrition. Most of the research is conducted by the All-Russian Public Opinion Research Center, regional newspapers or universities. Based on one of these social studies conducted in 2021 by the editors of media ‘‘Vaznye Istorii’’ (2021), it is worth noting that it was revealed that a third of older people in Russia live in a state of chronic loneliness. Data of the All-Russian Center for the Study of Public Opinion (2017) from the latest research revealed several main problems concerning the elderly in Russia. Among them are the following that can be viewed in **Figure 4**.

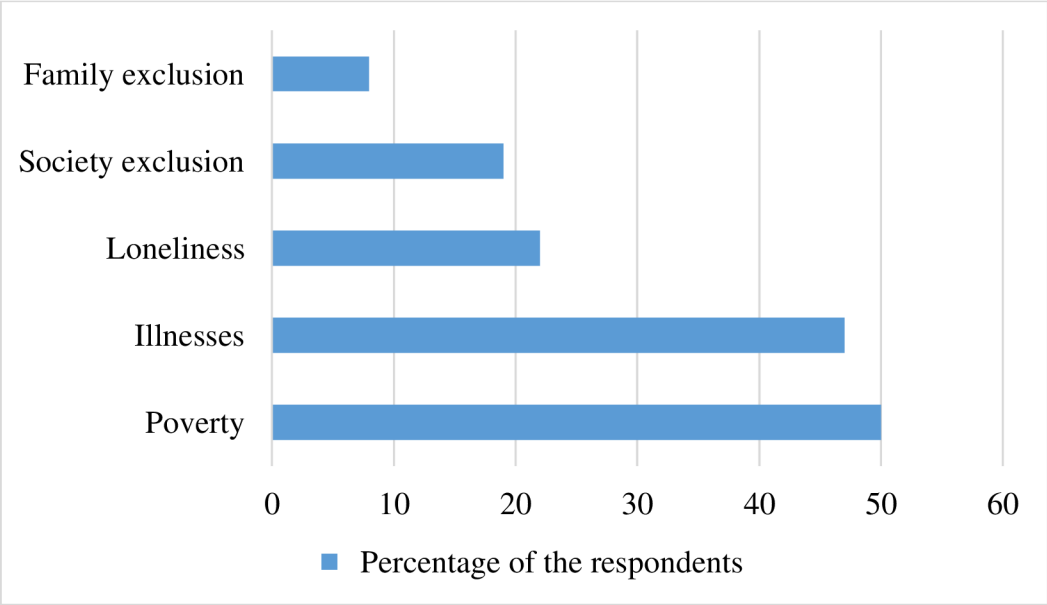

Figure 4. Problems of the elderly in the Russian Federation

Source: All-Russian Center for the Study of Public Opinion (2017)

In 2018, the Russian Higher School of Economics conducted a monitoring of the economic situation and health of the population. Based on this monitoring data, it was revealed that every third person over 70 years old experiences chronic loneliness. In **Figure 5**, the dynamics of the received research data can be viewed.

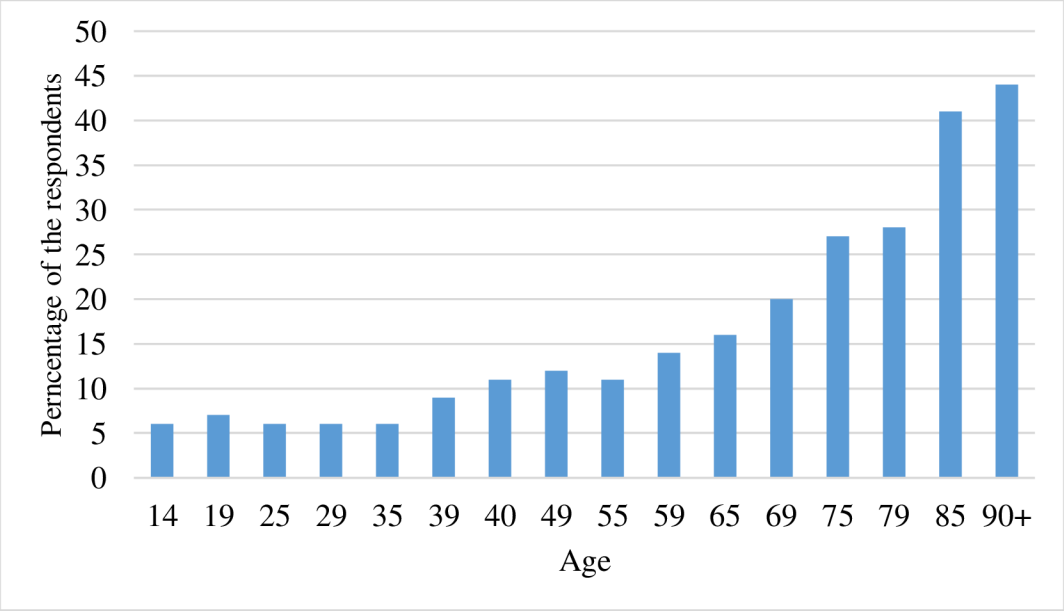

Figure 5. Percentage of age group respondents who feel lonely almost always or often

Source: RHSE (2018)

In the conducted research, sociologists found out that loneliness is directly related to poverty: lack of financial resources leads to a decrease in a person's social activity, limits the number of contacts with other people, the possibilities of communication (RHSE 2018). According to this research, 50% of the poorest people over 70 experience chronic loneliness. Federal State Statistics Service (2019) also recorded the link between poverty and loneliness. At the same time, the majority elderly in the country is poor. Pension in Russia is only 29% of the average salary. Consequently, as Shadrina & Chapala (2021) stated, for a more harmonious and favorable adaptation on entering the period of old age, a person must maintain and prolong social activity to accumulate personal potential and pay attention to maintaining and improving vitality and mental tone. Moreover, the transformation of society must also be carried out, where the elderly will become an important part of it with socio-economic support from the state.

Bekele (2020) and Nordhagen et al. (2022) noted, all health-related factors, nutrition and food security are interconnected. To create a viable level of food security, elderly has to have a good nutritional status and pattern of food consumption. That is why nowadays in Russia there is an increase of importance of gerodietic nutrition. In general, there are certain rules concerning elderly nutrition. Dzachmisheva (2014) among them mentioned the principle of energetically balanced nutrition and compliance of the chemical composition of food with the age characteristics of the body.

Prokopenko et al. (2021) noted alkaline orientation of nutrition, normalization of the intestinal microflora of an aging organism and meal frequency (4-5 times a day). Konev (2014) sees enrichment of food with nutrients and inclusion in the diet of foods that moderately stimulate the secretory and motor function of the digestive system as one the most important rules of elderly nutrition. In Russia, a gerontological research and clinical center issues recommendations related to how elderly should eat. In 2019, this center issued guidelines related to the nutrition of the elderly. They also stated three main rules of elderly nutrition (Tkacheva 2019):

1. Compliance with the amount of energy (calorie content) the amount of food consumed by the amount of energy expended during the movement during the day.

2. Maintaining a balance of nutrients (proteins - 15%, fats - 30%, carbohydrates - 55% of the daily calories), vitamins and minerals.

3. Compliance with the diet. Eating at least 4-5 times a day at the same time, without overeating before bedtime.

Ivleeva et al. (2017) in her research pointed out the importance of following the physiological and energy needs of age. There are norms of physiological needs for energy and nutrients for the elderly presented (**Table 12**).

Table 12. Norms of physiological needs for energy and nutrients for the elderly

Indicators, daily	Meaning of indicators for	
	Men 60+ years of age	Women 60+ years of age
Energy, calories	2300	1975
Protein, g	68	61
Including animal protein, g	34	30.5
Protein, % of daily energy requirements	12	12
Fats, g	77	66
Fats, % of daily energy requirements	30	30
Monounsaturated fats, % of daily energy requirements	10	10
Polyunsaturated fats, % of daily energy requirements	6-10	6-10
Carbohydrates, g	335	284
Added sugar, % of daily energy requirements	<10	<10
Dietary fiber, g	20	20

Source: Ivleeva et al. (2017)

In order to support the right eating pattern, there are also rules regarding the distribution of the energy value of the daily ration that was mentioned by Tkacheva (2019) (**Table 13**).

Table 13. Distribution of the energy value of the daily ration of the elderly in the Russian Federation

Eating period	4 meals a day	5 meals a day (options)	
Breakfast	25-30%	20-25%	25%
Second breakfast	-	10-15%	-
Lunch	35-40%	30%	35%
Afternoon snack	-	-	10%
Dinner	20-25%	20-25%	20-25%
Second dinner	5-10%	5-10%	5-10%

Source: Tkacheva (2019)

Pogozheva (2017) presented in her research the approximate daily range of products for the consumption of elderly, developed by the Institute of Nutrition of the Russian Academy of Medical Sciences (**Table 14**). More diet recommendations for elderly can be seen in Appendix 1 (Russian gerontological scientific and clinical center 2021).

Table 14. Approximate daily range of products for the consumption of elderly in the Russian Federation

Products	Weight, g	Food group
Lean meat (beef, veal, chicken)	170	Meat/fish products
Fish (mackerel, herring, tilapia)	35	
Milk, kefir	400	Dairy products
Cottage cheese	70	
Cheese	18	
Sour cream, 10% of fat	100	
Butter	10	
Eggs	25	Eggs
Fruits, juices	300	Fruits and juices
Vegetables	840	Vegetables (cruciferous, marrow, root, allium)
Oil (sunflower seed oil)	20	Oil
Rye or wheat bread	300	Bread
Buckwheat, oats, durum, semolina		Cereals
Sugar (added)	25	Sugar
Salt	6	Salt

Source: Pogozheva (2017)

According to nutritional traditions in Russia, elderly consume fermented vegetables (sauerkraut or other pickled vegetables) and sour milk based products. Dzachmisheva (2014) as well as Artyuchova & Inozemtseva (2018) mentioned importance of the above-mentioned products in the elderly nutrition naming them ‘‘functional products’’. For the elderly, it is important to normalize the microflora of the gastrointestinal tract, thereby strengthening the body's immune defenses. These functional products contain probiotics and prebiotics that help to restore and multiply the ‘‘good’’ intestinal microbiota.

Considering the cold winters in Russia, before the spring majority of population develops the condition called ‘‘avitaminosis’’ that is directly linked with the nutrition. It especially affects elderly due to the not well-maintained nutritional status (Russian gerontological research and clinical center 2023). In general, avitaminosis is a condition characterized by vitamin deficiency. In Russia, the main reason for avitaminosis is lack of vitamins in winter. Although among the elderly this condition can be triggered also by other reasons (Russian gerontological research and clinical center 2021).

The reasons include insufficient nutrition, long-term use of certain medications, disruption of the digestive system and old age metabolic disorders. To combat that condition Tkacheva (2019) recommends vitamin therapy (including intravenously and intramuscularly), dieting and treatment of diseases of the gastrointestinal tract. Depending on the missing vitamin, elderly is prescribed a diet that includes products containing vitamins C, E, B1, B2 and D (Shich & Machova 2016). Among them are beans, rosehip syrup and rosehip tea, black currant, potato, cabbage, nuts, eggs, milk, meat, fish, bread products, etc. The best prevention/treatment for the avitaminosis among the elderly is to maintain a well-balanced diet and seasonally (fall/spring) take prescribed vitamins.

In general, the nutrition and health paradigms of the elderly population in Russia are a complex phenomenon, since regions in the context of the country differ from each other in terms of socio-economic development, climate, demographics, etc. In this regard, aspects related to the above concepts may also differ. In general, at present, the importance of the elderly population for Russia is only just beginning to be realized, as there are studies devoted to the inclusion of the elderly population in the social life of the country. The importance of especially nutrition is also understood. In the end, measures aimed at improving both the socio-economic situation of pensioners will make it possible for Russian society to become more holistic.

3. Aims of the Thesis

The study's main aim was to investigate the nutritional status and interventions for improving nutrition among the elderly in Russia.

3.2. Specific objectives

1. To assess the phenomenon of malnutrition among the elderly in Russia.
2. To examine eating habits among the elderly in Russia.
3. To propose a food pattern for a more balanced diet among the elderly in Russia.

4. Methods

4.2. Study area

The city of Sterlitamak, located in the Republic of Bashkortostan, Russia, was chosen for the study (**Figure 6**).

Figure 6. Republic of Bashkortostan. Orange arrow – Sterlitamak

Source: elaborated from the Official website of the Republic of Bashkortostan (2023)

In Sterlitamak, a social-oriented house was chosen, located at Sagitova street, 2d (**Figure 7**). This choice was made because the study was conducted jointly with the Sterlitamak autonomous non-profit organization ‘‘Veteran Social Services Center’’ (further – organization ‘‘Veteran’’). The chosen house is social-oriented, and mostly elderly people live there. The apartments in this building were received by the elderly from the government or from the organization where they worked.

The organization ‘‘Veteran’’ provides social services for the elderly in several districts of the city, and a social-oriented house at Sagitova street, 2d is one of them.

Figure 7. Social-oriented house. Sterlitamak, Sagitova street, 2d
Source: Personal photo (2020)

The house consist of three blocks and a total of 132 residential apartments, of which elderly people inhabit 76. Organization ‘‘Veteran’’ serves all apartments where elderly live, providing various kinds of social and medical-related services for the elderly based on their need.

For the study, one of the important factors is also the availability of grocery stores. The following grocery stores are located around the house within a radius of 1-3 km – the stores are presented in order of distance from the house:

1. ‘‘Nakhodka’’ is a grocery store of a social type, which means that in the store of this grocery chain, in accordance with the directives of the Government of Russia, a zero trade margin is set for a number of socially significant goods, among which are the following:

– Beef, pork, lamb (except for boneless meat), chickens (except for chicken legs), whole frozen fish.

– Butter, sunflower oil, drinking milk, chicken eggs.

– Granulated sugar, edible salt, long leaf black tea.

– Rye bread, rye-wheat bread, bread and bakery products made from wheat flour.

– Polished rice, millet, buckwheat, pasta.

– Potatoes, white cabbage, onions, carrots, apples.

2. ‘‘Pyaterochka’’ is a social grocery store. It also sets a zero trade margin for the number mentioned above of socially significant goods.

3. ‘‘Mini Magnet’’ – the choice of products is the same as in the ‘‘Family Magnet’’ store, but the variety is somewhat less, there are constant discount offers.

4. ‘‘Family Magnet’’ – a large selection of products with constant discount offers.

5. ‘‘Chizhik’’ is a store of the ‘‘world of low price’’ concept, which can be achieved by minimizing redundant logistics processes and costs.

6. ‘‘Perekrestok’’ – a store of medium and high price segments.

7. ‘‘Optovik shopping center’’ – the concentration of many grocery stores that small business ownerssmall business owners own own. The trade margin for products is minimal. A lot of products, including bulk ones (cereals, sugar, salt, flour and other products can be bought by weight.

8. ‘‘Kolchozny rynok’’ – the concentration of the sale of farm products or goods with a minimum trade margin. The prevailing number of products sold are produced by companies in the Republic of Bashkortostan.

4.3. Sampling procedure

The following selection method was chosen for the study: non-random homogeneous sampling. It is necessary to focus on precise similarity. The following criteria were set to determine the sampling frame:

1. Age: 60-75 years.

2. Source of income: pension.

3. Living conditions: social-oriented house in Sterlitamak, Sagitova street, 2d.

The age was defined in this sampling frame because, based on the laws of the Russian Federation in the field of social assistance to pensioners, when they reach the age of 85+ years, they are entitled to a pension supplement of 100% of their previous pension.

To minimize economic differences between the sample of participants, an age frame of 60-75 years was indicated (**Figure 8**).

Figure 8. Selection of study participants

4.4. Data collection process

The entire process of collecting the data necessary for the study was carried out jointly with the organisation's staff, ''Veteran''. Thirteen social workers working in this organization are assigned to this social-oriented house. All of them have a specialized education: all 13 employees have a higher education related to providing social services to various groups of the population, and nine out of thirteen employees also have a particular medical education. All thirteen employees have completed advanced training in working with the elderly, making them qualified to help with data collection. Data collection relied on the following two tools:

1. Mini Nutritional Assessment – Long Form in the Russian language.
2. The 7-days food diary.

Social workers already had encounter with MNA – LF.This became possible because this tool is officially used in Russia in the social and medical sphere of communication with the elderly. It is also recommended the Russian gerontological scientific and clinical center (Tkacheva 2021). Data collection occurred between the 23rd and 29th of January 2023.

Starting with the first tool – MNA – LF (English form is presented in Appendix 2), it can be said that it is designed to identify malnutrition or the risk of malnutrition in older people. Nestle company developed this tool and is one of the most widely used nutritional screening tools for the elderly (Yost et al. 2014).

The information collection with this tool was conducted using the Russian language version of the questionnaire – one printed A4 document that can be filled up with the information by hand. Social workers were asking questions and doing the required measurements. The MNA – LF requires personal information from respondents such as first and last name, sex, age, weight in kg, height in cm, and date of assessment. The MNA – LF test consist of two main parts: screening and assessment. In the ‘‘Screening’’ part, there are five statements and questions related to:

1. Decline of food intake.
2. Weight loss.
3. Mobility.
4. Presence of psychological stress or acute disease.
5. Presence of neuropsychological problems.
6. BMI.

After getting answers to these questions, the screening score can be find out representing:

1. 12–14 points – normal nutritional status.
2. 8–11 points – at risk of malnutrition.
3. <7 points – malnourished.

In the ‘‘Assessment’’ part, there are 12 statements and questions related to:

1. Independence of living.
2. Medication.
3. Presence of full meals.
4. Consumption of fruits and vegetables.
5. Consumption of protein sources.
6. Fluid intake.
7. Mode of feeding.
8. Self-reflection on nutritional status and health.
9. Mid-arm circumference.
10. Calf circumference.

The maximum amount of points for this past is 16. After getting answers to these questions, the screening score should be added to the assessment score, revealing the following results:

1. 24–30 points – normal nutritional status.
2. 17–23.5 points – at risk of malnutrition.
3. <17 points – malnourished.

To find out the respondent's weight, the social workers carried a floor portable scale with them. The centimeter tape was also used to measure mid-arm and calf circumference. Considering that data is being collected in a home environment without access to the medical records, the height measurements was chosen for the ‘‘demispan’’ method (**Figure 9**).

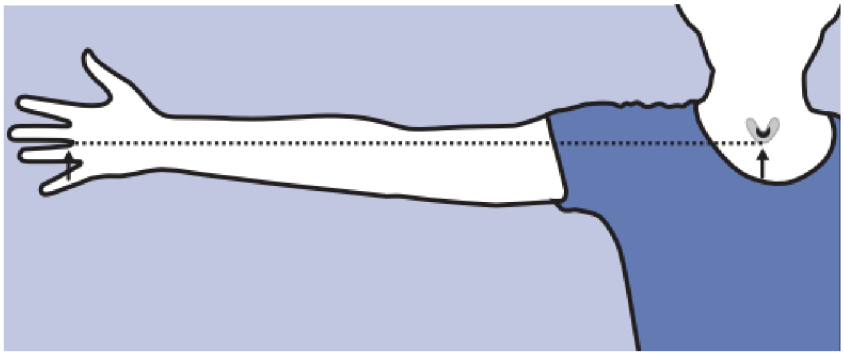

Figure 9. Measuring height using demispan

Source: South West Regional Wound Program (2015)

Demispan is the distance from the midline at the sternal notch to the web between the middle and ring fingers along the outstretched arm. This tool for height measurement is often used for the approximate determination of the elderly’s height (Hirani & Mindell 2008). Height is then calculated using a standard formula (**Table 15**).

Table 15. Calculation height using demispan method

Females	Males
Height in cm = (1.35 x demispan in cm) + 60.1	Height in cm = (1.40 x demispan in cm) + 57.8

Source: South West Regional Wound Program (2015)

The 7-days food diary was offered to the elderly to study the variability and fullness of their diet to determine their nutritional status. Screening using MNA – LF was conducted before the 7-day study of respondents' eating. Each 100 respondents was given two sheets in A4 format to fill in the diary. The diary format is presented in Appendix 3 (in English language). The used study format did not assume the exact weight of all food consumed by the respondents during the seven days of the study. The research format used was aimed at identifying the general eating pattern of the respondents and consumed food groups – whether their diet is nutritive enough or not.

4.5. Data analysis

All available data collected from the completed survey instruments (The MNA – LF and the 7-days food diary) were then calculated using Microsoft Excel software.

To find the relationship between the nutritional status of the elderly and food security, the Food Consumption Score was also calculated. Food Consumption Score is an index developed by the WFP in 1996 (WFP 2008). The FCS aggregates household-level data on the diversity and frequency of food groups consumed over the previous seven days, which is then weighted according to the relative nutritional value of the consumed food groups. Based on the data from the score, a household's food consumption can be further classified into three categories:

1. 0–21 – poor.
2. 21.5–35 – borderline.
3. >35 – acceptable.

Usually this index is calculated after completing a small questionnaire, however, considering the completed 7-days food diary with the detailed overview of everything that was eaten, there was no need for additional questions, since based on these data from the above-mentioned tool it was possible to calculate the index. Further, all data are calculated based on the following **Table 16**.

Table 16. A completed food consumption score template for individual

Food item	Food group	Weight (A)	Days eaten in the past 7 days	Score A x B
Maize, rice, sorghum, millet, bread and other cereals	Cereals, tubers, and root crops	2	x	x
Cassava, potatoes, and sweet potatoes				
Beans, peas, groundnuts, and cashew nuts	Pulses	3	x	x
Vegetables, relish, and leaves	Vegetables	1	x	x
Fruits	Fruits	1	x	x
Beef, goat, poultry, pork, eggs, and fish	Meat and fish	4	x	x
Milk, yoghurt, and other dairy	Milk	4	x	x
Sugar and sugar products	Sugar	0.5	x	x
Oils, fats, and butter	Oil	0.5	x	x
Composite score				x

Source: World Food Program (2008)

Food pattern, as a measure for a more balanced elderly's diet, was created based on the guidelines of Russian gerontological scientific and clinical center and Institute of Nutrition of the Russian Academy of Medical Sciences. Food pattern was created for a 7-day period.

4.6. Ethical considerations

All selected participants were informed about the objectives of the study and informed consent was obtained before the conducted research. Selected participants were also informed about their right to discontinue his/her participation from the study at any point of data collection. All information from the study was used only for research purpose and confidentiality of the data was maintained throughout the study.

5. Results and Discussion

The study group of respondents was comprised of 100 individuals – 67 females, 33 males. As shown in **Figure 10** below, based on the MNA-LF results, 8 out of 100 respondents scored less than 17 points, indicating the presence of malnutrition. With a score between 17 and 23.5, 69 out of 100 respondents were at risk of malnutrition. Only 23 out of 100 respondents indicated normal nutritional status.

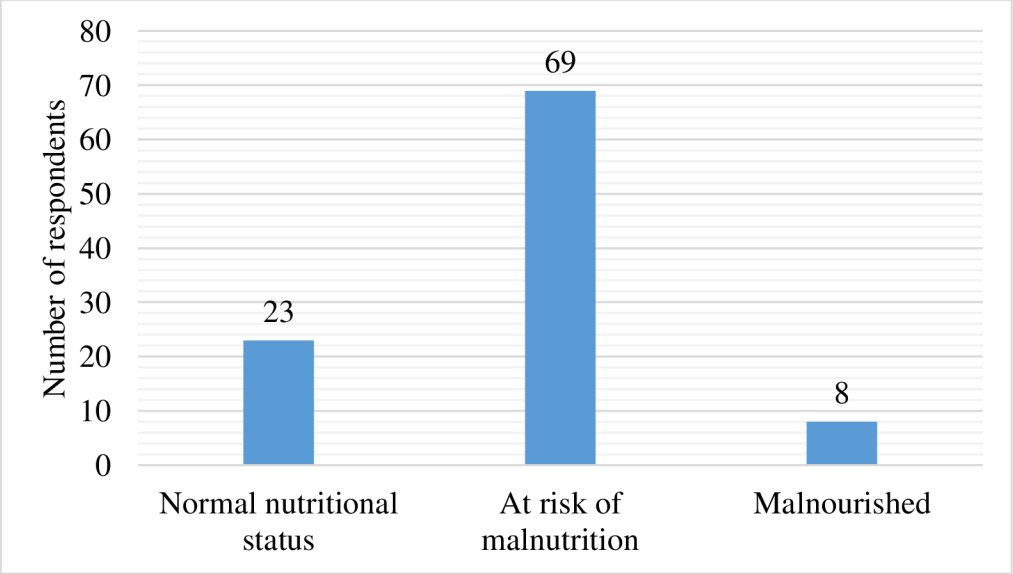

Figure 10. Malnutrition prevalence among the elderly

According to the 7-days food diary and the data from the MNA – LF, the following prevalence of the eating habits was found that is shown in **Figure 11**:

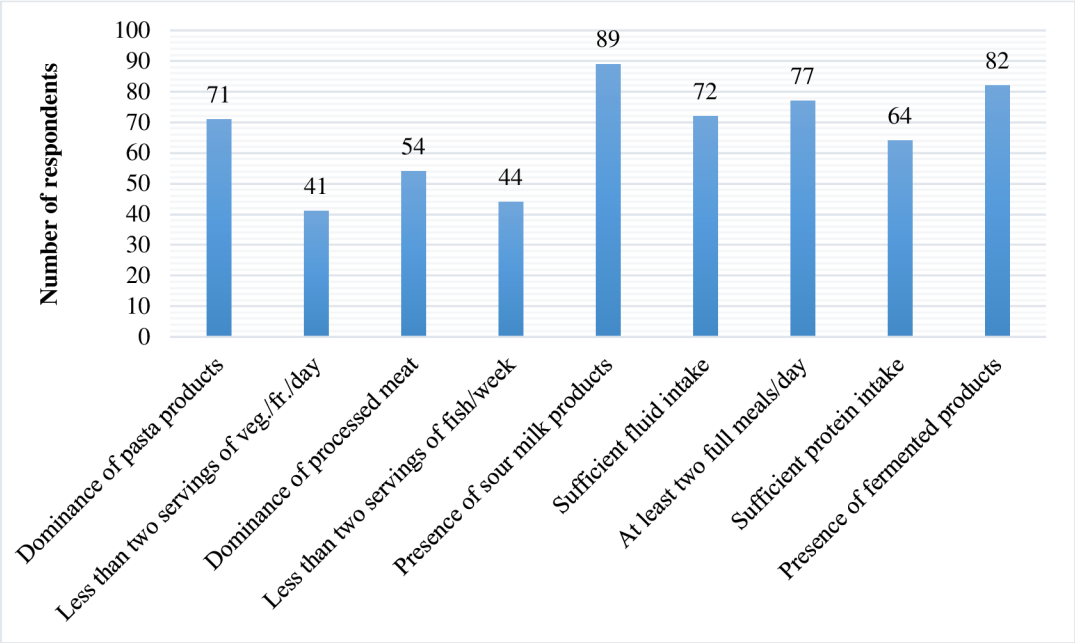

Figure 11. Eating habits prevalence among the elderly

The results showed that the prevailing number of respondents (71 respondents) had pasta products in their weekly diet more than five times a week. Predominantly, pasta products were consumed with some vegetables or meat side dish for lunch and dinner. The Institute of the Russian Academy of Medical Sciences and Russian gerontological scientific and clinical center does not recommend this. Although pasta products are slow carbohydrates, it is not recommended to eat products of this category by elderly more than three times a week. Forty-one respondents indicated that they consume less than two servings of vegetables and fruits per day, which is an unfavorable characteristic of the nutritional status of an elderly person, given that two or more servings of vegetables and fruits are the norm to maintain a favorable nutritional status of an elderly person. The following vegetables and fruits were mainly consumed fresh, baked or boiled: apples, viburnum, black currant, oranges, bananas, white cabbage, potatoes, carrots, beets, onions, garlic. Eating less than two servings of fruits and vegetables daily can lead to vitamin and macronutrient deficiencies in the long term and worsen the general condition of the elderly.

Among 54 respondents, dominance of processed meat was also revealed, which indicates that the products of this category were consumed by the respondents daily, which is not a favorable trend in eating behavior due to the presence of low nutritional value in products of this category. In this category sausages were mostly eaten. 44 respondents in their weekly diet contained less than two servings of fish, which is an insufficient norm for the consumption of this product according to the recommendations for the nutrition of the elderly adopted in Russia. Predominantly, preference was given to such varieties of fish as tilapia, mackerel and herring which are economically more affordable.

Sour milk products were consumed on a daily basis by 89 respondents. This category of products is a cultural food tradition in Russia among the elderly, since the need for daily consumption of fermented milk products is being broadcasted in the media. What is more, sour milk products help keep the digestive tract functioning well by providing calcium and probiotics to elderly. Based on the data obtained, such types of sour milk products as ryazhenka, kefir, cottage cheese, sour cream, katyk (a goat milk product that is traditional for the study region – the Republic of Bashkortostan) and kumis (a fermented horse milk product that is traditional for the study region – the Republic of Bashkortostan).

Turning to sufficient fluid intake, 72 respondents drank more than 5 cups of fluid per day. One cup of liquid is approximately 200-300 ml, which leads to the conclusion that more than 1-1.5 liters of liquid were drunk per day, which is in line with the recommendations adopted in Russia. The following drinks were predominantly examples of liquid: water, milk, green tea, black tea, milk tea, chicory, herbal tea, rosehip tea, and dried fruit compote. The number of meals is also an important determinant of favorable nutritional status in older people. Seventy-seven respondents noted that they had at least two full meals daily, usually for lunch and dinner. These meals included the presence of soup with meat or vegetable broth, as well as porridge with vegetables or meat. The porridges were based on buckwheat, rice, millet, or pasta products were used. This observation is borderline for maintaining a favorable nutritional status, as the Institute of the Russian Academy of Medical Sciences and Russian gerontological scientific and clinical center recommends that elderly should have 4-5 meals daily.

Given that protein-energy malnutrition dominates in old age, it is important to track this parameter by getting enough protein. According to the data obtained, only 64 respondents had sufficient protein intake in their eating behavior. The preferred protein sources according to the study, were animal protein: chicken, pork, beef, and less often – fish, cheese, milk, eggs, and vegetable protein: beans, peas, walnuts, sunflower seeds, whole grain bread, rice, millet, buckwheat. Another cultural food tradition is the consumption of fermented products. The study showed that 82 respondents consumed fermented products at least thrice a week. The predominantly consumed fermented products were sauerkraut, kombucha (known as tea mushroom in Russia), and fermented pickles. These products also positively affect maintaining a favorable nutritional status among the elderly.

The obtained data from MNA – LF and the 7-day food diary helped to calculate Food Consumption Score. It is relevant to the correlation between food security and nutritional status (in **Figure 12**).

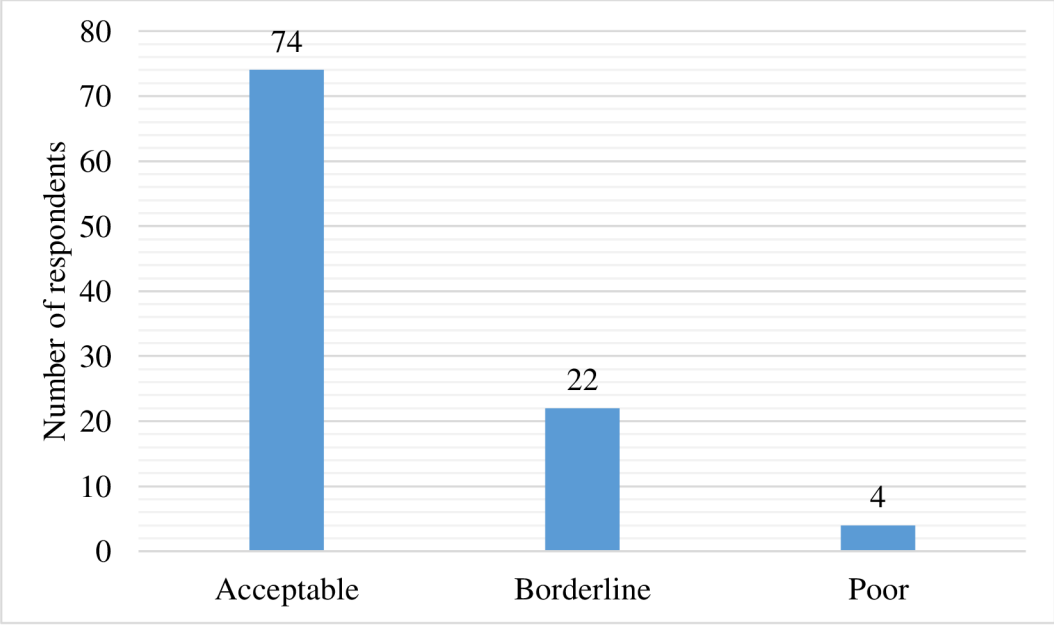

Figure 12. Household food consumption status among the elderly

Based on the obtained data, 74 respondents are characterized by an acceptable level of the household's food consumption status. 21 respondents have a borderline level of the household's food consumption status, and four respondents have shown a poor level of the household's food consumption status.

Although the vast majority of respondents – 74 – showed an acceptable household's food consumption status, there are also limitations. So, one of the limitations is that even if it was recorded that the respondent consumed one or another food group per day, this would already be considered as ''one score gained for a food group''. However, it is necessary to look at the complete picture of the nutritional status of the elderly since eating the same food group can be repeated daily. Therefore points will be awarded; however, this is not a positive nutritional trend, especially for elderly, since a variety of food groups is needed as well as their quantity and quality, which is advised by the Institute of the Russian Academy of Medical Sciences and Russian gerontological scientific and clinical center. In general, this index can show the household food consumption score, but to validate and get more valuable and more proved results, more relevant tests are needed to cover the problem from different points of view. The MNA – LF and the 7-days food diary were more valid for this research.

6. Conclusions and Recommendation

The first objective was to assess the phenomenon of malnutrition among the elderly in Russia. The study revealed that in the Russian Federation, the nutritional status of elderly is not widely represented in the spectrum of study, since this is not viewed as a problem at the state level. However, in Russian society, among the elderly, the problem of eating behavior exists, being in correlation with other socio-economic phenomena, which generally worsen the life status of elderly. The study carried out indicated the presence of a problem of malnutrition. Due to the need for further research, conducting a further theoretical search for literature related to the study of malnutrition in the Russian scientific segment is recommended. It is also recommended to conduct another study on malnutrition in other organisations-controlled social-related houses jointly with the ‘‘Veteran’’ organization, recruiting another group of elderly for further research and possible correction of eating habits.

The second objective was to examine eating habits among the elderly in Russia. The findings showed that the eating habits of older people are not entirely favorable for maintaining a healthy lifestyle due to the repetitive nature of eating habits and some bad eating habits, such as excessive consumption of processed meat and pasta products. Although there were positive eating habits in the diets of the older adults in the study group. In general, their eating habits need to be adjusted in favor of a more nutritious diet. To do this, it is necessary to carry out educational work with the elderly as well, which can be carried out by employees of the ‘‘Veteran’’ organization, since some of them have a medical education and are aware of the principles of gerodietary nutrition.

The third objective was to propose a food pattern for a more balanced diet among the elderly in Russia. The suggested food pattern was developed based on the recommendations from the Institute of the Russian Academy of Medical Sciences and Russian gerontological scientific and clinical center, as well as cultural food traditions. The following food pattern covers 7 days of eating that is presented in Appendix 4. The food pattern can be repeated from week to week, combined and changed based on the elderly’s preferences. Moreover, for shopping, it is better for elderly to visit the following grocery stores: ‘‘Pyaterochka’’, ‘‘Nakhodka’’, ‘‘Chizhik’’ and ‘‘Kolchozny rynok’’ that will help to get more affordable variety of grocery products, as well as farm-based products.

The diet of the elderly should include also functional foods, which include fermented foods such as sauerkraut and pickled vegetables (cucumbers, tomatoes, peppers). The pattern of eating behavior of elderly in Russia is characterized by the preparation of their own fermented foods in the summer. However, for the elderly, this process should be made as easy as possible by making the process of fermenting products.

For recommendation that can further enhance the handling with fermented products, during an internship in Sweden on a farm (Åkerby Handelsträdgård) between August 18 and September 25, 2022, the cold fermentation technique was studied, which is characterized by the following advantages:

1. The speed of the process.
2. Availability of initial materials (glass jar, lid + ingredients).
3. No need for product pasteurization.

This technique is most suitable for cold fermentation of cucumbers. Its steps are as follows:

1. Put three tablespoons of salt, two-three whole cloves of garlic and a sprig of dill on the bottom of the jar.
2. Fill a 700 g glass jar with washed cucumbers.
3. Fill the jar with the ingredients inside with cold water.
4. Close the lid.
5. Put the jar in a cool place without the possibility of direct sunlight.
6. After three weeks, the product can be eaten.

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Appendix 1: Diet recommendations for elderly

1. The optimal proportion between animal and vegetable proteins is 1:1. Vegetable proteins are found in grains, legumes, soybeans.

2. It is recommended to cook soups on the secondary broth (the meat is cooked after boiling for 2-3 minutes, then the broth is drained, new water is poured and the soup is already cooked on it. It is needed for the removal of purines that can lead to gout.

3. Avoid the use of smoked products and meat and sausage products.

4. It is better to cook food without adding fat – it is more useful to cook, stew, bake or steam.

5. The use of so-called ‘‘simple’’ carbohydrates should be limited (sugar, sweets - sweets, cakes, pastries).

6. Vitamins and minerals rich food:

– vitamin C: citrus fruits, sweet peppers, black currants, onions, sauerkraut.

– vitamin E: vegetable oils, flaxseed, cereals, milk.

– B group vitamins: fermented milk products, green leafy vegetables, green onions, spinach, nuts.

– vitamin D: daily walks in the fresh air during daylight, plus additional intake prescribed by medical professionals.

– folic acid: leafy green vegetables, kidney beans, liver.

– calcium: dairy products, fish, nuts, poppy seeds.

– magnesium: legumes.

– zinc: fish, eggs, cheese, beef, lamb.

7. The recommended daily intake is 2-3 servings of fruits and 3-4 servings of vegetables. One serving of fruit is one large fruit (apple, pear, orange) or 3-4 small ones (plum, tangerine, strawberry). One serving of vegetables is 1/2 cup chopped cooked vegetables or one cup chopped fresh vegetables.

8. Fluids: it is necessary to drink at least 1.5 L/day. The following drinks can be consumed as well: chicory, rosehip tea, herbal tea, compote from stewed fruits.

Appendix 2: Mini Nutritional Assessment – Long Form

Last name: First name:

Sex: Age: Weight, kg Height, m

Complete the screen by filling in the boxes with the appropriate numbers. Add the numbers for the screen.

Screening

A Has food intake declined over the past 3 months due to loss of appetite, digestive problems, chewing or swallowing difficulties?
0 = severe decrease in food intake
1 = moderate decrease in food intake
2 = no decrease in food intake

B Weight loss during the last 3 months
0 = weight loss greater than 3kg (6.6lbs)
1 = does not know
2 = weight loss between 1 and 3kg (2.2 and 6.6 lbs)
3 = no weight loss

C Mobility
0 = bed or chair bound
1 = able to get out of bed / chair but does not go out
2 = goes out

D Has suffered psychological stress or acute disease in the past 3 months?
0 = yes 2 = no

E Neuropsychological problems
0 = severe dementia or depression
1 = mild dementia
2 = no psychological problems

F Body Mass Index (BMI) = weight in kg / (height in m)^2
0 = BMI less than 19
1 = BMI 19 to less than 21
2 = BMI 21 to less than 23
3 = BMI 23 or greater

Screening score (subtotal max. 14 points)
12-14 points: Normal nutritional status
8-11 points: At risk of malnutrition
0-7 points: Malnourished

For a more in-depth assessment, continue with questions G-R

Assessment

G Lives independently (not in nursing home or hospital)
1 = yes 0 = no

H Takes more than 3 prescription drugs per day
0 = yes 1 = no

I Pressure sores or skin ulcers
0 = yes 1 = no

J How many full meals does the patient eat daily?
0 = 1 meal
1 = 2 meals
2 = 3 meals

K Selected consumption markers for protein intake
- At least one serving of dairy products (milk, cheese, yoghurt) per day — yes / no
- Two or more servings of legumes or eggs per week — yes / no
- Meat, fish or poultry every day — yes / no

0.0 = if 0 or 1 yes
0.5 = if 2 yes
1.0 = if 3 yes

L Consumes two or more servings of fruit or vegetables per day?
0 = no 1 = yes

M How much fluid (water, juice, coffee, tea, milk...) is consumed per day?
0.0 = less than 3 cups
0.5 = 3 to 5 cups
1.0 = more than 5 cups

N Mode of feeding
0 = unable to eat without assistance
1 = self-fed with some difficulty
2 = self-fed without any problem

O Self view of nutritional status
0 = views self as being malnourished
1 = is uncertain of nutritional state
2 = views self as having no nutritional problem

P In comparison with other people of the same age, how does the patient consider his / her health status?
0.0 = not as good
0.5 = does not know
1.0 = as good
2.0 = better

Q Mid-arm circumference (MAC) in cm
0.0 = MAC less than 21
0.5 = MAC 21 to 22
1.0 = MAC greater than 22

R Calf circumference (CC) in cm
0 = CC less than 31
1 = CC 31 or greater

Assessment (max. 16 points)
Screening score
Total Assessment (max. 30 points)

Malnutrition Indicator Score

24 to 30 points	Normal nutritional status
17 to 23.5 points	At risk of malnutrition
Less than 17 points	Malnourished

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For more information: www.mna-elderly.com

Appendix 3: 7-days food diary

Last name:

First name:

DATE	DAY OF THE WEEK	BREAKFAST + SECOND BREAKFAST	LUNCH	DINNER	SNACKS: afternoon snack or evening snack
23.01.2023	Monday				
24.01.2023	Tuesday				
25.01.2023	Wednesday				
26.01.2023	Thursday				
27.01.2023	Friday				
28.01.2023	Saturday				
29.01.2023	Sunday				

Comments:

1. Please, write down in the appropriate cell of the table everything that you ate during the meal in as much detail as possible.

2. The “Soup” food element should be written as follows: ingredient + ingredient + ingredient, for example, potatoes + carrots + onions + chicken broth, etc.

3. The ‘‘Main dish’’ food element should be written as follows: ingredient + ingredient + ingredient, for example, rice + meat + onions + sauerkraut, etc.

4. The “Porridge” food element should be written as follows: ingredient + ingredient + ingredient, for example, oatmeal + apple + honey, etc.

5. The “Ragout” food element should be written as follows: ingredient + ingredient + ingredient, for example, potatoes + chicken meat + carrots + onions, etc.

6. The “Salad” food element should be written as follows: ingredient + ingredient + ingredient, for example, boiled potatoes + boiled chicken meat + boiled carrots + mayonnaise, etc.

7. Bread and bakery products can be written as is, for example, a piece of rye bread, a piece of white bread, a bun, etc.

8. Liquids can be written as is, for example, tea, juice, milk, kefir, water, coffee, chicory, etc.

Appendix 4: The proposed food pattern for a more balanced diet among the elderly in Russia

Day	Eating period	Food pattern
1st day	Breakfast	– millet porridge with butter – sandwich with butter and cheese – green tea – fresh fruits
	Lunch	– salad with fresh carrot, garlic and sunflower oil – potato soup with beef meatballs – one piece of bread – dried fruit compote
	Afternoon snack	– yogurt – sweet bun ‘‘Plushka’’
	Dinner	– steamed fish – mashed potato or pearl barley porridge – one piece of bread – dried fruit compote
	Second dinner	– a glass of kefir
2nd day	Breakfast	– barley porridge with butter – sandwich with butter and cheese – tea with milk – fresh fruits
	Lunch	– salad ‘‘Olivier’’ from cooked carrot, potato, green pea and egg – fresh cabbage borscht with chicken – one piece of bread – dried fruit compote
	Afternoon snack	– cottage cheese casserole with condensed milk and sour cream – cranberry compote – one banana
	Dinner	– one tomato – cabbage rolls with rice – tea with milk
	Second dinner	– a glass of ryazenka
3rd day	Breakfast	– milk noodles with butter – sandwich with butter and cheese – black tea – fresh fruits
	Lunch	– vinaigrette – mushroom puree soup with chicken broth – buckwheat porridge – dried fruit compote
	Afternoon snack	– carrot cutlets with sour cream

		– chicory
	Dinner	– fermented sauerkraut – one boiled egg – braised cabbage with noodles – rosehip tea
	Second dinner	– a glass of katyk
4th day	Breakfast	– semolina porridge with butter – sandwich with butter and cheese – cranberry – black tea
	Lunch	– herring with onion and vegetable oil – soup ‘‘Kharcho’’ with chicken – mashed potatoes – dried fruit compote
	Afternoon snack	– sweet bun with jam – fruit kissel
	Dinner	– chicken meatballs with tomato sauce – barley porridge – one piece of bread – herbal tea
	Second dinner	– a glass of kefir
5th day	Breakfast	– millet porridge with butter – sandwich with butter and cheese – cocoa – nuts – fresh fruits
	Lunch	– salad ‘‘Crab’’ – noodles soup with fermented sauerkraut – liver fritters – dried fruit compote
	Afternoon snack	– pancakes with sour cream and jam – green tea – raisins, dried apricots, prunes
	Dinner	– one tomato – pilaf with chicken meat and raisins – one piece of bread – dried fruit compote
	Second dinner	– a glass of unsweetened yogurt
6th day	Breakfast	– rice porridge with milk and butter – sandwich with butter and cheese – herbal tea – nuts – fresh fruits
	Lunch	– vegetable casserole – soup ‘‘Solyanka’’ – one piece of bread – dried fruit compote

	Afternoon snack	– omelet – fruit kissel – sweet bun ’‘Plushka’’ – dried fruit compote
	Dinner	– braised cabbage with beef meat – mashed potato – one piece of bread – rosehip tea
	Second dinner	– a glass of ryazenka
7th day	Breakfast	– porridge ‘‘Druzba’’ with butter – sandwich with butter and cheese – cocoa – fresh fruits
	Lunch	– sauerkraut – salad ‘‘Seld’ pod shuboi’’ – noodles with minced beef meat – dried fruit compote
	Afternoon snack	– cottage cheese casserole – dried fruit compote
	Dinner	– buckwheat porridge with vegetables – one piece of bread – green tea
	Second dinner	– a glass of katyk