

## Article

# The Transformation of Food Culture on the Case of Kyrgyz Nomads—A Historical Overview

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**Abstract:** The society in Kyrgyzstan experiences a triple burden of malnutrition which occurs when undernutrition, overnutrition and micronutrient deficiency coexists, straining the public health system. This research investigates historical trends of nutrition transition of nomadic and semi-nomadic Kyrgyz and foods consumed earlier before industrialisation and intensification of agriculture started. Qualitative research design inspired by historical analysis and sociological methods were employed. Saturation sampling was used to conduct 15 semi-structural interviews and informal conversations with non-participant observation. Secondary data analysis was conducted based on Kyrgyz nomads' scientific studies from history and anthropology, agricultural politics and nutrition studies. Results suggest that Kyrgyz nomads have undergone several periods of change of social and political order since the mid-19th century till nowadays from nomadic tribe-based system to predominantly sedentarism and limited semi-nomadic lifestyle. The collectivisation of farms, urbanisation and planned type of economy led to shifts in lifestyle and diets. Furthermore, with trade liberalisation and open economy policies, the entrance of food corporations impacted the nutritional status of the population. The study also reveals several traditional foods rich in nutrients. Consumption of forgotten and neglected plants might improve the nutrition status of the current population. Nutrition intervention programs should definitely consider locally available foods as part of public nutrition.

**Keywords:** nutrition transition; nomadism; transition economies; the triple burden of malnutrition; food security; traditional knowledge; medicinal foods and plants



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## 1. Introduction

In 2020, around two billion people could not have safe, nutritious and sufficient food daily [1]. Kyrgyzstan is a landlocked and mountainous country in post-Soviet Central Asia with a population of over 6 million. Inadequate and poor diet in certain parts of the population is the underlying cause for multiple health issues existing in the country. According to WHO [2], 83% of non-communicable diseases (NCDs) were responsible for deaths in 2016. At the same time, statistics show that the number of people with cardiovascular diseases increased by around 8% in the country between 2015 and 2019 [3]. Maternal and child malnutrition is one of the public health problems in Kyrgyzstan. Regardless of several economic and political crises during the last 30 years, independent Kyrgyzstan has experienced improvements in several human nutrition indicators, partly owing to nutrition intervention programs [4].

Flour fortification and Gulazyk (micronutrient powder for children under 3 and 5) have been introduced to improve the nutritional status of different parts of the population [5]. Gulazyk showed a positive result for reducing iron deficiency but was insufficient for diminishing anaemia levels for Kyrgyzstan [5,6]. This might be due to the worsening of households' food security [5] and the growing availability of fast foods [7]. Low-income

families are more vulnerable to external shocks, such as abrupt changes in food prices. For the period 1990–2017 the child malnutrition situation substantially improved, but regional inequalities remain. At the same time, maternal nutrition status has not dramatically improved for the last 20 years [4].

The coexistence of undernutrition, overnutrition and micronutrient deficiency in a society named triple burden of malnutrition currently exists in Kyrgyzstan. Political, economic, social and cultural transformations impact the habitual lifestyle and accustomed diet of a group of people. With entering market relations, dietary changes are occurring in many societies. In a rapidly changing world, it is essential to look back and explore the different societal phenomenon. As societies face political and economic transformations, how do these influence their diet? Does it stay the same or evolve with new realities? This is the underlying question driving us to understand how nomadic Kyrgyz's diet and nutrition changes have developed over the last 170 years.

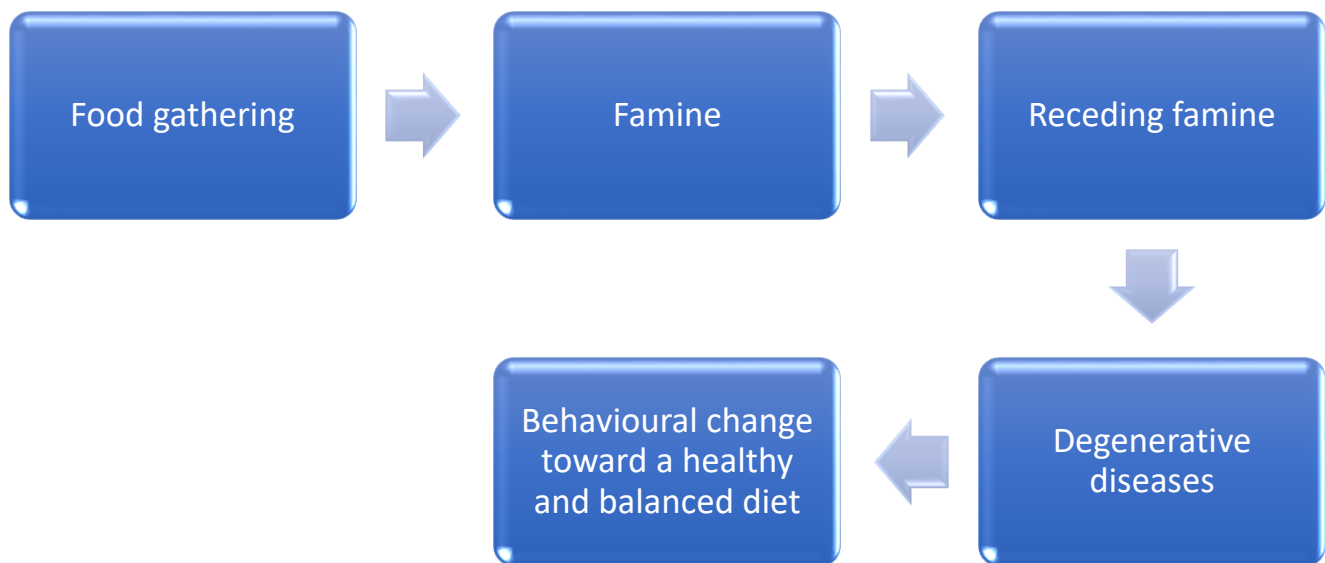
Limited literature exists which discusses typical food starting the 19th century among nomad Kyrgyz. Thus, this paper aims to explore how the food culture of Kyrgyz was evolving before and during the socialist rule and during the post-independence era. The reason for choosing these historical periods is three different socio-political systems representing complex societal transformation: (1) Tribal system (Mid 19th century–1922); (2) Socialist/communist (1922–1991); (3) The market economy (1991–today).

The objectives of this article are to (i) make a historical overview of major changes which have occurred in the past 170 years within Kyrgyz communities; (ii) understand how three political and economic systems are related to nutrition transition, and (iii) explore forgotten foods and medicinal plants. Our hypothesis states that with shift to the industrialisation of agriculture and marketisation of the economy, centuries-long consumed authentic food is under the danger of disappearance and the growing popularity of Western-oriented food impact nutrition transition and health pattern of population.

## 2. Theoretical Framework

Theory of nutrition transition concerns with humanities' diet changes occurring across time and space. It derives from epidemiological and demographic transition theories that study humans' life expectancy patterns and causes of death. Humans go through five stages of nutrition transition (Figure 1), starting with food gathering when consumption of carbohydrates and fibre is high, and that of fat is low coupled with the advanced physical activity and thus low obesity levels. Famine belongs to the period of extreme food shortage, settlement and cultivation of basic crops (Stage 2). Stage 3 refers to the state of receding famine when the consumption of fruits, vegetables and protein increase and carbohydrates in diets decrease. It is accompanied by increased production in agriculture and thus less physical human activity. Stage 4 is characterized by high consumption of processed foods and fibre, low activity levels and thus high obesity rates among the population. Levels of degenerative diseases also rise. Conscious attitude to nutrition coupled with a behavioural change toward a healthy and balanced diet is the last stage of the nutrition transition [8–11].

Most low and middle-income countries, including Kyrgyzstan, are currently at stage four, at which the humans diet consists of a high intake of oils, sugars, animal products, processed foods and sweeteners [12]. This type of diet often leads to nutrition-related non-communicable chronic diseases (NR-NCDs). The term nutrition transition connotes diet changes in which consumption of fruits and vegetables, animal products, fats and sweets increase, whereas intake of fibre decreases. These transitions happen due to income improvements [13]. As the definition of this term clearly explains changes in diet patterns, it omits background transformations taking place, leading societies to a different and unhabituated nutrition pattern. Thus, nutrition scientists focus mostly on how certain nutrients impact human health rather than exploring overall political, economic and cultural settings influencing dietary patterns [14].



**Figure 1.** Stages of nutrition transition (source: authors’ visualization based on the theory of nutrition transition).

Nowadays, low and middle-income countries face diet changes into the so-called “Western diet” [15,16]. The term entails turning away from traditional and mostly unprocessed foods towards a high intake of energy-dense foods such as sugars, refined carbohydrates, fats and foods originating from animals [14]. These changes took place partly due to agricultural policies [15]. The well-known Green Revolution helped to fight hunger and famine in many nations by increasing yields, but it also homogenized food supplies [14].

Assumptions exist that lower and middle-income countries face the increase of obesity and NR-NCD prevalence more rapidly than that of Western countries [9]. There is a belief that urban poor tend to consume obesogenic food. This might explain the existence of hunger and obesity in the same setting [15]. The pace of the shift from a subsistence economy to industrialization in emerging economies was much faster—only within 10–20 years [9].

Kyrgyz people are known for cattle breeding as it was the primary occupation for centuries. Approximately 7–8 B.C., Kyrgyzstan’s territory was a place of numerous Turkic nomadic tribes, including the most famous Sakas and Wusuns. When health issues, such as micronutrient deficiency, occur, societies need to research traditional food systems to deal with malnutrition. Scientific literature lacks data on traditional foods, making it impossible to include these valuable plants in nutrition programs [17]. Lack of awareness of traditional foods’ value, changing dietary habits and societal beliefs concerning certain foods contribute to malnutrition [18].

### 3. Methodology

Qualitative research design inspired by historical analysis and sociological methods were employed. The research is of explanatory and exploratory nature making attempts to study the past to understand the current state and driven by questions of how and why nutrition transition has been taking place among Kyrgyz nomads. This methodology supports deep understanding of the ways major societal changes influence food culture. Primary and secondary data collection was employed in this study. Primary data were obtained through 15 semi-structural expert interviews, personal experiences and conversations, together with non-participant observation [19] with notes taken and statistical data from the National Statistical Committee (NSC) of the Kyrgyz Republic. The number of interviewees was reached via saturation sampling, at which we understood that an additional interview would be less likely to give new insights to our study [20]. Key informants were historians, food experts, political scientists, representatives of different

ethnic groups and individuals sharing their experiences. Questions differed depending on the background of a key informant. Based on information from the primary sources, we consulted secondary sources to back up our arguments. Secondary data were based on Kyrgyz nomads' scientific studies from history and anthropology fields, the literature of politics of the Soviet Union, agricultural policies and nutrition studies. Secondary data analysis [21] was applied while evaluating and employing these studies in the analysis performed in this paper.

#### 4. Results

Results of this study are based on primary and secondary data. Primary data include key informants N = 15 and statistical data on various indicators of countries' development. Table 1 gives explanation on the interviewees.

**Table 1.** Information on key informants.

Domains	Category	N
Occupation/Interest	Agriculture expert	2
	Political/historical/food scientist	4
	Medicinal plants expert	3
	(Nomadic) food expert	6
Age	Under 45	5
	46 and above	10
Gender	Female	12
	Male	3
Regional representation	North	7
	South	8
Personal experience in nomadic lifestyle	Yes	14
	No	1

Secondary data are based on existing nutrition literature on the region, studies on history and economy of Kyrgyzstan during the last couple centuries.

Observing dietary changes through historical perspective and political changes among Kyrgyz nomads provides us with new insights. This part will describe how the socio-economic situation was changing during these three historical periods. Kyrgyz were predominantly nomads practicing animal husbandry. Land policies and new ethnic groups brought new farming practices, new vegetables and fresh food, thus diversifying local cuisine. Together with that, Central Asia was turned into agricultural production site during the Soviet Union due to its favourable climatic conditions for growing various crops, fruits and vegetables and animal husbandry. This process has a double-sided impact on nutrition transition and the environment as the diversity of existing food became available, shifting diets towards energy-dense foods. At the same time, the intensification of agriculture led to soil degradation and water depletion. This scenario continued in the post-independence period. Table 2 demonstrates the three politico-economic systems indicating their characteristics.

**Table 2.** Kyrgyzstan in three periods: Pre-Soviet period, Socialist rule under USSR and a market-based economy (source: based on the literature review).

Politico-Economic System	Time Period	Characteristics
Pre-Soviet	Mid 19th century–1922	Imitates feudal system (For the sake of partial explanation and generalization we put here as “feudal system”, although it would be much explanatory to depict the setting as community based tribal system, where a tribe consisting of one large intergenerational family each serving head of a tribe. For detailed explanation, see [34].) Lack of territorial integrity Villages on the tribal system The nomadic way of life Agriculture (disperse) Planned type of economy Industrialisation of agriculture
Communist Rule under the Soviet Union	1922–1991	Collectivization of farms Settlement and semi-nomadic lifestyle Urbanization Market-based economy
Liberal Economy	1991–today	Privatization and private property The entrance of global food labels into the local market (corporations) Predominantly settled lifestyle with a very small portion of seasonal semi-nomads

#### 4.1. Pre-Soviet Kyrgyzstan

Kyrgyz are an ancient Turkic-speaking people first mentioned supposedly in the 3rd century B.C. [23]. The oral poetic and multifaceted musical culture of the Kyrgyz nation contributed to the maintenance of the national identity of Kyrgyz. The world’s longest epos, “Manas” depicts both century-long fightings of the Kyrgyz with strong Mongolian nations and migration from Altai to the Tian Shan.

The ancient Kyrgyz people were well aware that proper nutrition contributes to the body’s positive functioning, helps the vital functioning of internal organs and cells, supports their constant and systematic renewal and enrichment, and is a source of energy for humans. Malnutrition, both excess and inadequate, can cause significant harm to health worsening overall well-being, negatively affects physical and mental development, leads to fatigue, inability to resist adverse external environmental influences, decreased working capacity, and even premature ageing and shortened life expectancy. The Kyrgyz people have attached particular importance to nutrition as a critical element of national culture and a significant factor in physical and mental development. Children from an early age were brought up to a proper nutrition culture, taught to distinguish good, high-quality food from bad and low-quality, taught to cook nutritious and delicious dishes.

The traditional nutrition system of the Kyrgyz is based on nomadic animal husbandry of mountainous geographical zones [24]. Nomadism is a way and a result of adapting to the natural and economic situation [25]. The common belief that nomadic tribes’ diet was originated only from animal sources is fallacious. Findings suggest that their diet was based on a complex pastoralist system involving agriculture [26]. Ecological circumstances, namely, availability of water resources, precipitation, location and others defined agricultural activities. Among others, foxtail millet (*Setaria italica*), wheat (*Triticum aestivum*), barley (*Hordeum vulgare*), broomcorn (*Panicum miliaceum*), even grapes (*Vitis vinifera*) were particularly part of Central Asian nomad’s diet in the Early Iron Age [26,27]. This was partly possible due to the existence of irrigated agriculture.

The economy of Kyrgyz was generally comprehensive. The second place after cattle breeding was occupied by almost everywhere widespread agriculture. For many mountainous regions, it was characterised by peculiar features of nomadic agriculture [28]. Applied artfully and developed a very long time ago, irrigation techniques adapted to high altitude conditions. Irrigation ditches called *aryk* were often arranged at high altitude, in the rocky ground with a stone bed. The irrigation system allowed nomads, after sowing, to move to pastures and return to harvesting. Depending on precipitation, irrigated agriculture was combined with rainfed [28].

Traditional food items included fermented beverages and some locally grown crops. *Kymyz* (koumiss, kumiz) is a traditional drink made of fermented mare’s milk. Cereal-based fermented drinks such as maksym, bozo and jarma belong to national beverages (Table 3).

**Table 3.** List of foods consumed by Kyrgyz (based on [29,30]).

Name in Kyrgyz	Ingredients	Explanation
<i>Kurut</i>	Cottage cheese	Dried hard cheese
<i>Maksym</i>	Oat flour/barley	Beverage
<i>Bozo</i>	Fermented drink made of millet, maize, barley and wheat	Beverage
<i>Jarma</i>	Barley/wheat, flour, malt	Cold beverage
<i>Talkan</i>	Barley/wheat/corn	Oatmeal mixed in water, milk or curdled milk
<i>Botko</i>	Millet	Porridge
<i>Kymyz</i>	Fermented mare’s milk	Every day drink of a Kyrgyz nomad
<i>Byshtak</i>	Milk	A type of fresh and cottage cheese from boiled milk

The main elements of the nutrition system remained until the beginning of the 20th century. Socio-economic changes inevitably influenced food and nutrition transitions. Economic, cultural and interethnic integration processes played a significant role in the nomad Kyrgyz’s nutrition and food system [24]. Before the Russian annexation, the Kyrgyz people were already consolidated as a nation. Discovered archaeological findings on Kyrgyzstan’s modern territory show the existence of rich and diversified culture [28]. Heavy physical activity such as cattle grazing, preparation of dry fodder manually was an essential part of livelihood. Traditions and rituals were used as a healing method both for humans and cattle. Horse or sheep meat was consumed not by one family, but it was fairly distributed by each member of an extended family or even a tribe. This tradition shows that nomads cared for the health and nutrition of each tribe and family member. Thus, the social justice principle was presently securing the politics and security of the tribe [31].

The Russian and Ukrainian peasants positively influenced local agriculture [28], as they shared their practice and experience of fishing, beekeeping, growing and other agricultural practices with the Kyrgyz farmers since the 1860s and 1870s. The share of agriculture has long been higher in the economy of southern Kyrgyz. In Northern Kyrgyzstan, its importance began to increase after the entry of Kyrgyzstan into Russia [28]. Part of the impoverished households with a small number of cattle having switched to agriculture. For many low families with no livestock at all, farming has become the only source of livelihood. Under the tsarist agrarian policy, the transition to agriculture and poor Kyrgyz was often forced and proceeded far from painlessly [22].

In the colonial context, the term “tribe” connotated with underdeveloped or primitive. Kyrgyz tribes, similar to those of other regions, had strong tribe identification in private and social life. The kinship and tribal system of Kyrgyz was a form of social organisation. Feudal and patriarchal governance system consisted of manap, datka, biy (elite) and kedey (poor) [32]. Along with home crafts, hunting also played a prominent role in the Kyrgyz people’s economic structure, in which the ancient features (collective hunts, hunting with birds like eagles) stand out distinctly. *Aiyl*, a village, represented a small group of dwellings where close relatives resided together as a community. A *yurt* was a traditional housing that could be easily dissembled and transported [29]. Kyrgyz were well aware of the plant cultures that grow in the arid and semi-arid areas they inhabited [33]. The introduction of land ownership and being attached to a particular geographical setting was unfamiliar to the nomad Kyrgyz. For him or her, the land was associated with belonging to a tribe, group of people or a state [34].

#### 4.1.1. Foods Including Drinks and Medicinal Plants

Observed literature on nutrition suggests that Kyrgyz nomads’ diet consisted of meat, dairy and some grain varieties. Fruits and vegetables have almost no mention in the

scientific works. “Did nomads consume them at all?” is a question that drove us further to study the question of nomadic nutrition. Today we know that the territory of Kyrgyzstan is highly biodiverse. Wild fruits and nuts grow in Kyrgyzstan, including cherry plums, pears, apples, apricots, pears, grapes, almonds, pomegranates, walnuts, pistachios, etc., as well as wild crops of wheat, rhubarb, garlic, onion, anise, sorrel and oats [35]. We assume that Kyrgyz nomads have well consumed all these wild fruits and vegetables to fulfil nutritional demands and for medicinal reasons.

Bozo is a low alcohol traditional fermented beverage made of millet, maize and barley and wheat [30]. Gulazyk (or kulazyk) is a traditional powder-like, micronutrient-rich, dry and easily transportable food. Kyrgyz travelling long distances would take them for their journey as it obtained property of not getting rotten for several months. Exact ingredients are forgotten, but the powder consisted of meat, flour, grasshopper and other nutritious substances.

The development of urban areas has lessened the role of medicinal plants and increased reliance on modern medicine [36]. The utilization of plants for nutritional and medicinal purposes is an ancient tradition. Traditional medicine uses many medicinal plants that were not enlisted in the official encyclopedia but have been used traditionally. Thanks to climatic and geographical conditions, Kyrgyzstan is rich in medicinal plants (Table 4). Most likely that Kyrgyz ancestors used them for nutritional as well as therapeutic purposes.

**Table 4.** Plants of Kyrgyzstan used in traditional medicine [37,38].

Botanical Name	Name In Kyrgyz	Parts Used and Preparation	Health Properties
Angelica Brevicaulis (Rupr.) B. Fedtsch	Kyska sabattuu kerech	Decoction of herbs	Sinks blood pressure, diuretic
Arum Korolkowii Regel	Korolkov arumu; kuchala	Tuber tincture, small doses (toxic)	Libido boosting
Codonopsis Clematidea (Schrenk.) Clarke	Koguroodoj sasyk; boor chöp	A decoction of herbs in small amounts (toxic)	Liver problems
Cysticorydalis Fedtschenkoana (Regel) Fedde Ex Ikonn.	Fedchenko örmö karasy	Root extract	Arthronosos, tumor
Dactylorhiza Umbrosa (Kar. & Kir.) Nevski (Orchis Umbrosa)	Kölököl arala	Decoction of buds	Respiratory tract inflammation, gastritis, diarrhoea, paralic, cramps, cough, tuberculosis, digestion, hair growth
Dictamnus Angustifolius G. Don Fill. Ex Sweet.	Ichke jalbyraktuu diktamnus; shakyl dak	Root extract	Kidney inflammation
Korolkowia Sewerzowii Regel	Severcov algysy	Decoction of buds	Gastrointestinal disease
Ferula Kokanica Regel Et Schmalh.	Kokon chajryy	Decoction of herbs	Asthma, headache, fatigue, nervous agitation
Perovskia Scrophulariifolia Bunge	Norichniktej koen tomuk	Tea from its dried flowers	Gastrointestinal disease
Rheum Maximowiczii Losinsk.	Maksimovich yshkyny	A decoction of roots and leaves	Leaves decoction for digestion; root extract for against worms for children
Scrophularia Kiriloviana Schischk.	Gazzak chaj	Decoction of herbs	Gums issues, stomatitis
Leontopodium Alpinum	Mamyry	A decoction from dried flowers	Detox effect, strengthens the immune system, diarrhoea
Mumijo (Shilajit)	Mumijo	Organomineral product biologically sourced	Bones, digestion
Aconitum Leucostomum Worosch—Ranunculaceae	Uu korgoshun, ak kodol	Toxic, dried roots used, used with traditional drink kymyz	Rheumatism, radiculitis, antibacterial effect, arthrosis, podagra, brucellosis
Thymus	Kijik ot	Decoction of leaves	Diuretic, digestion, heart and lung issues

#### 4.2. Dynamics under the Soviet Planned Economy

##### 4.2.1. Settlement of Nomads and Urbanisation

The Soviet government attached great importance to the settling of nomads. The collectivisation of agriculture brought fast transformations to society. As a result of the allocation of considerable funds, in just 3 years (1932–1934) 34,500 nomadic and semi-nomadic Kyrgyz farms were transferred to settled [28]. Urbanization was develop-

ing together with the establishments of new settlements of Slavic peasants from Russia. The northern part of the country's favourable climate, fertile soil and arable land attracted these peasants. North Kyrgyzstan turned into multi-ethnic urban centres [34]. Impoverished Kyrgyz then began to settle in Bishkek by becoming labourers to Slavic peasants. Deprivation of pasture lands led to continuous conflicts with the local population. Characteristics of these changes include:

- Communal ownership of resources;
- Establishment by Russian peasants and setting new administrative units led to the disruption of the accustomed social order of Kyrgyz nomads;
- Nomad Kyrgyz had to adjust to new administrative and political orders [34].

The process of settlement and urbanisation of nomads was implemented in a forced manner. Tribe leaders' cattle and livestock were taken away, forcing them to abandon their settlement and escaping to China regardless of hard winter periods. The unification of previously scattered families in one village led to the development of new forms of life, to the restructuring of industrial and domestic life [28]. At the same time, agricultural reforms including formation of collective farms, technological advancement supported increase of agricultural production.

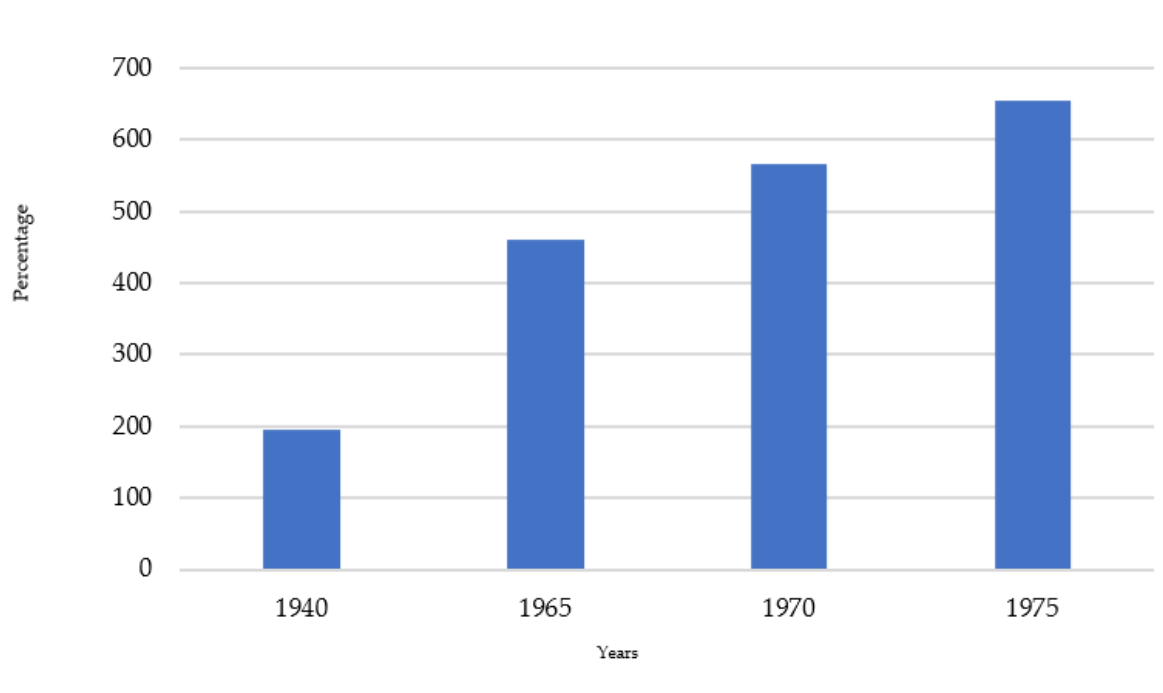
#### 4.2.2. Food and Agricultural Policies under a Planned Economy

Social policies introduced by the Soviet government played a considerable role in the health and nutrition of Kyrgyz nomads. The development of social public health was based on the idea of insurance for all and vaccination. These measures led to the decrease of child mortality, an increase in population, and prolonged life expectation (see supplementary materials). Universal access to education guaranteeing that every child attends primary school improved substantially the literacy rate among population. Welfare-oriented policies, including the development and implementation of public nutrition standards and programs impacted nomadic food culture. Industrial production of food, processing, marketing led to the increase of food supply [39].

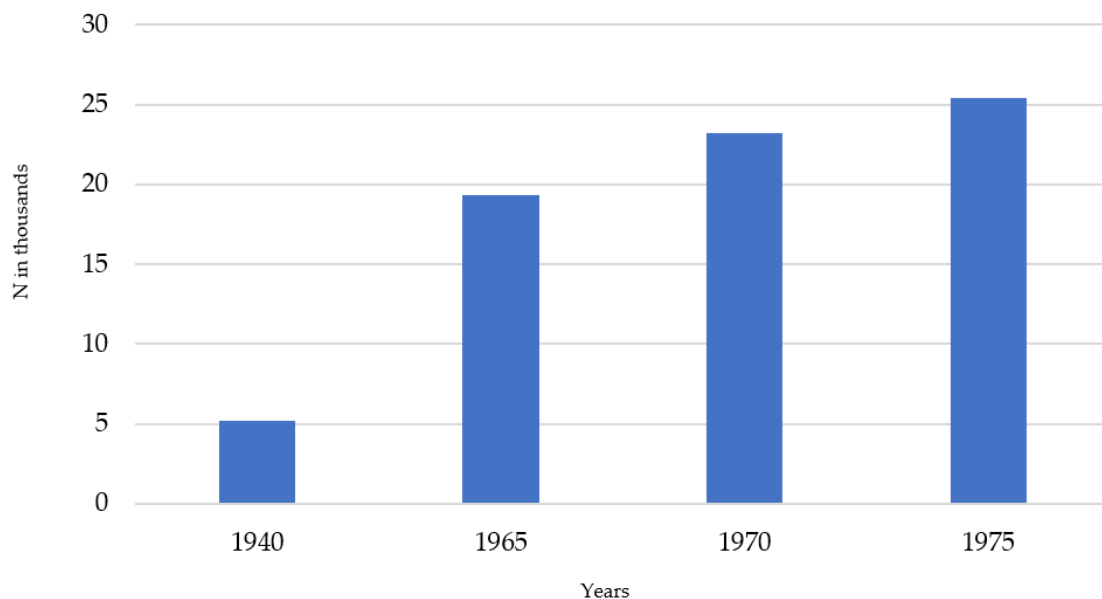
In the 1960s, Khrushchev's policy on increasing meat and milk products and reducing potato and bread consumption was launched [39]. Substantial subsidies to meat and dairy products were made to increase the production of these food items. In the Soviet Union, diet changes began in the 1960s. Food policies led to the increase in consumption of meat, milk and sugar and decrease in bread and potatoes in diet during 1950–1989 (see Supplementary materials) [39]. We assume that similar diet changes happened in Kyrgyzstan as well as these food policies spread for the entire country. Their long-term effects will be discussed later in this article. During the Soviet Union, nutrition data collection was based on household food expenditure and purchases relatively, which was then converted into nutrients. Lack of systematic research and representative data [39] makes it challenging to assess different parts of the population's nutritional status.

Agricultural policy towards Kyrgyzstan was aimed at increasing farm animal production due to its environmental and traditional reasons. During the Soviet rule, the country's number of sheep reached its record level—over 11 million heads [40]. Availability of pastures depends on climatic condition ranging from 2.3 million ha in winter to 3.9 million ha in summer. As a result of the planned type of economy, overgrazing, land intensification and pasture degradation took place. Traditional practices on pasture management were neglected and forgotten from generation to generation [40]. Constituting mainly animal production, a growth rate of gross agricultural output increased substantially between 1940 and 1975 (Figure 2). Technological advancements in agriculture (Figure 3) took place, increasing per capita production in the country.





**Figure 2.** Growth rate of gross agricultural output in Kyrgyzstan for 1940–1975 years (in %, 1913 = base) [41].



**Figure 3.** Number of tractors in agriculture (in thousands) [41].

Within the Soviet Union, markets were interconnected, and prices were state-controlled. Thus, markets for agricultural products from Kyrgyzstan were guaranteed at state price [42]. During 1950–1970, sugar consumption, dairy products and red meat increased rapidly, whereas cereals and starchy tubers intake decreased in the Soviet Union. Consumption of vegetables, eggs, vegetable oil, fruits and fish increased in the whole Union [39]. We assume that these diet changes were common for the entire country, as Kyrgyzstan was part of the Soviet Union.

After the Russian Revolution and Soviet's policy on agriculture and land-water reforms, nomadic and semi-nomadic Kyrgyz households gradually settled down. Seasonal character of food, social differences in quality and quantity of food, and subsistence farming

dependence are weakened [29]. The changes in the Kyrgyz people's economic structure that came soon after the accession of Kyrgyzstan to Russia led to a noticeable increase in the diet share. In the subsequent period, the main types of food for the majority of the Kyrgyz population became dairy and vegetable, and only partially meat. Objective observers have long noted that beef was a luxury item for most Kyrgyz people and was only wealthy people's daily food.

#### 4.2.3. Different Settings in the North and the South

Historical developments in northern and southern Kyrgyzstan have some differences [29]. The Fergana valley lies on the southern part of Kyrgyzstan. The formation of populated Kyrgyz settlements began earlier because of interaction and trade relations with settled ethnicities such as Tajik and Uzbek. In the northern part, several villages appeared only at the very end of the 19th century. Their emergence resulted in new socio-economic conditions caused by the entry of northern Kyrgyzstan into Russia and the positive influence of the Slavic migrant peasants who appeared here [28]. For almost a century between the end of the 18th century and 1876, the Kyrgyz of Fergana valley was ruled by the Kokand Khanate. The Kokand figuratively ruled the Kyrgyz of the northern tribes residing on Issyk Kul lake's banks and rivers of Talas, Chu, and Naryn, but mostly by manaps tribal leaders [34].

Developed agriculture has existed in the Fergana Valley since the second half of the 1st century B.C. Materials collected on the valley Tian Shan prove that Kyrgyz practised irrigated agriculture, starting in the 17th–18th centuries [28]. Kyrgyz have knowledge of cattle breeding which was transmitted from generation to generation. The annexation of Kyrgyzstan to Russia resulted in a substantial increase in grain production due to agricultural development. New sectors started to develop, such as gardening, horticulture, beekeeping, and poultry farming, but traditional food and cooking remained almost the same [24].

Agriculture was an integral part of the entire economic structure of the Kyrgyz population in Osh oblast. In the south, the Kyrgyz cultivated wheat, corn, rice, melons and alfalfa. The complex nature of the economy in the pre-revolutionary period largely influenced the formation of southerners' nutritional characteristics. At the same time, the food of Kyrgyz of Issyk-Kul and Naryn zones was based on animal products such as meat and dairy. They grew wheat, millet, barley, a small number of oats and alfalfa for self-consumption [24].

Nutrition of families in locations where Russian and Ukrainian settlers were present differed from those in Osh or Naryn oblasts. The former's diet included fish, sausages, meat products and typical Russian-Ukrainian products such as borscht (cabbage, vegetable, meat soup), vareniki (dumplings), potato-based dishes, poultry. In contrast, families in Osh region included foods traditional Kyrgyz and some Uzbek foods such as shorpo (meat soup), plov (rice, carrot and meat second dish), kesme (noodles), lagman (hand-pulled noodles with meat and vegetables), manty (a bigger type of dumplings filled with meat and/or vegetables). Meat and noodle-based foods such as gulchotai, besh barmak, manty, oromo are predominantly consumed in Naryn region. Traditional drink consumed in the summer season includes jarma (crushed roasted grain, wheat or barley stew), maksym (a sour drink made from crushed barley without malt), bozo (hop drink) and kymyz (fermented horse milk) [24].

#### 4.3. Kyrgyzstan Enters a New Era of Independence

The transition from planned type of economy to market-based economic system affected food choice and its price. The collapse of the previously existing value chain ranging through different countries within the Soviet Union led to the rapid decrease of products for a short period of time. It also caused the destruction of water management and irrigation systems existing in Central Asian countries [33]. Excessive use of natural resources and poor management practiced before continued after its fall worsening ecological situation. For instance, nitrogen (N) usage had increased from 9200 tons in 1997 to 24,000 tons in 2017.

In contrast, phosphorus employment (P<sub>2</sub>O<sub>5</sub>) raised from 200 tons to 1400 tons for the same period in Kyrgyzstan [43]. This takes place due to the uncontrolled usage of chemicals and pesticides.

At the beginning of the 1990s, as the newly formed state, Kyrgyzstan faced a short period of a rapid decline of crop and livestock production in provinces. Lack of available food items shifted dietary changes towards basic and affordable foods [42]. This lasted till the mid-1990s, when food availability improved again after a short period of market restructuring. However, research shows that energy deficiency was not an issue in 1993. On the contrary, adult population consumed around 30% more fat than the recommended level [44]. This is probably the result of the Soviet's food policies promoting energy-dense products through subsidizing meat and milk products.

According to the theory of nutrition transition, economic growth impacts change in diet pattern. Kyrgyzstan experienced GDP per capita growth for the period of 1990 to 2019 with short period of economic decline in the end of 1990s as an effect of the financial crisis in Russia (Figure 4). Economic development changes employment patterns. Eating out becomes popular in many societies.

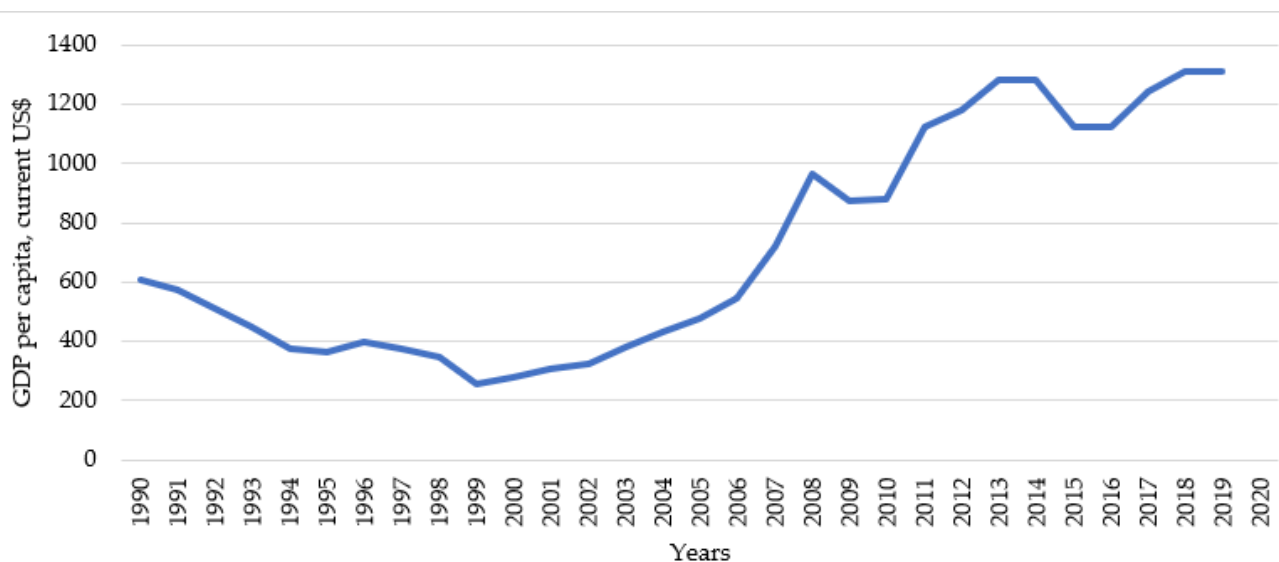
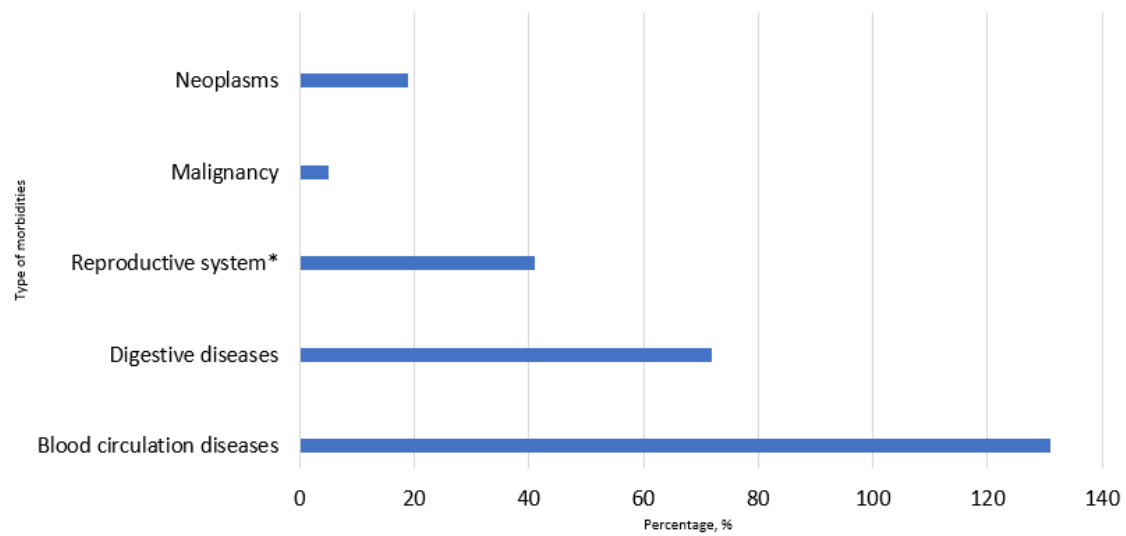


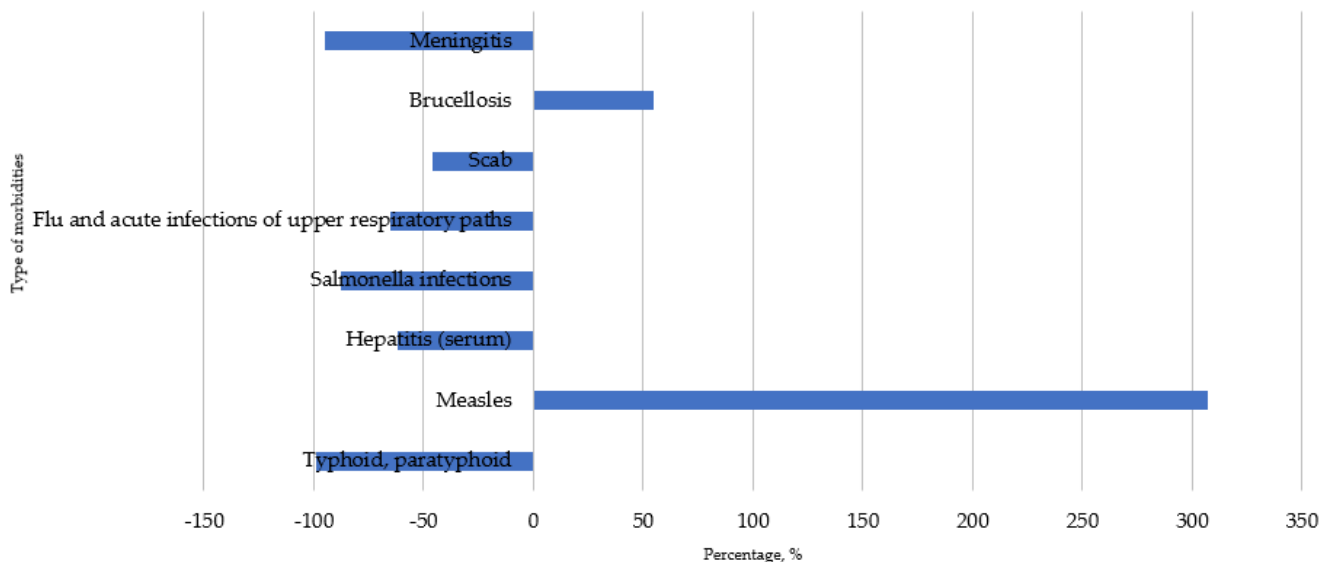
Figure 4. GDP per capita Kyrgyzstan in current USD [45].

With the gradual opening up the market, new products such as global food corporations started to appear on the table of rich people. Similar to Sri Lankan experience, consumption of these imported food items was considered a sign of luxury and thus fashionable [46]. Trade liberalisation has had a positive impact on nutrition in that it diversified food items became available to the population [14]. Due to free trade, loosening barriers for trade and food corporations' entrance in the new marketspaces, new food products, mostly highly processed, have become available to the population [16]. However, it also makes traditional foods less attractive, making highly processed food products more desirable [14].

Studies exploring diet change in transition economies discover that economic transition has increased chronic diseases and unhealthy diets [47]. Similar pattern is evident in Kyrgyzstan as well. Statistics shows that the rate of change of non-communicable diseases in Kyrgyzstan since independence increased (Figure 5), whereas the rate of change of communicable diseases for the same period mostly decreased (Figure 6).



**Figure 5.** Rate of change of non-communicable diseases in Kyrgyzstan 1990–2019 (based on [48]). \* Data for 1991.



**Figure 6.** Rate of change of communicable diseases in Kyrgyzstan 1990–2019 (based on [48]).

This shift from infectious diseases to non-communicable diseases is a trend taking place in many societies experiencing economic growth. Food balance sheet since 1990s demonstrate that processed and energy dense food products increased in Kyrgyzstan. Since population extracts more energy from fats and carbohydrates and are less physically active, development of non-communicable diseases such as diabetes mellitus, heart problems, cancer increase.

A nutritious, diverse and healthy diet is an effective method to sustain micronutrient balance [5]. The nutrition transition is accompanied by decreasing fibre intake consumption as household income increases [39]. Dietary data collected among Kyrgyz adults in 1993 show that fat consumption was 30% higher than recommended levels, whereas protein intake was adequate. Low BMI was detected among adults aged 18–29 and people over 60. About 5% of people in these age groups can be considered as undernourished. However, obesity was a bigger problem than undernutrition. 16% of adults aged 40–49 and 8% of 30–39 age groups were obese. Almost half of the respondents in the age group of 40–59 were overweight (BMI > 25.0). A total of 47% of the elderly were overweight. Women were especially prone to overweight and obesity. A study conducted in 1993 shows that obesity was a bigger problem than undernutrition in Kyrgyzstan [39].

Statistics show that the prevalence of anaemia among women of reproductive age increased during the period 2000–2016. Availability of imported highly processed foods might be a reason for the rising in obesity among adults (Figure 7).

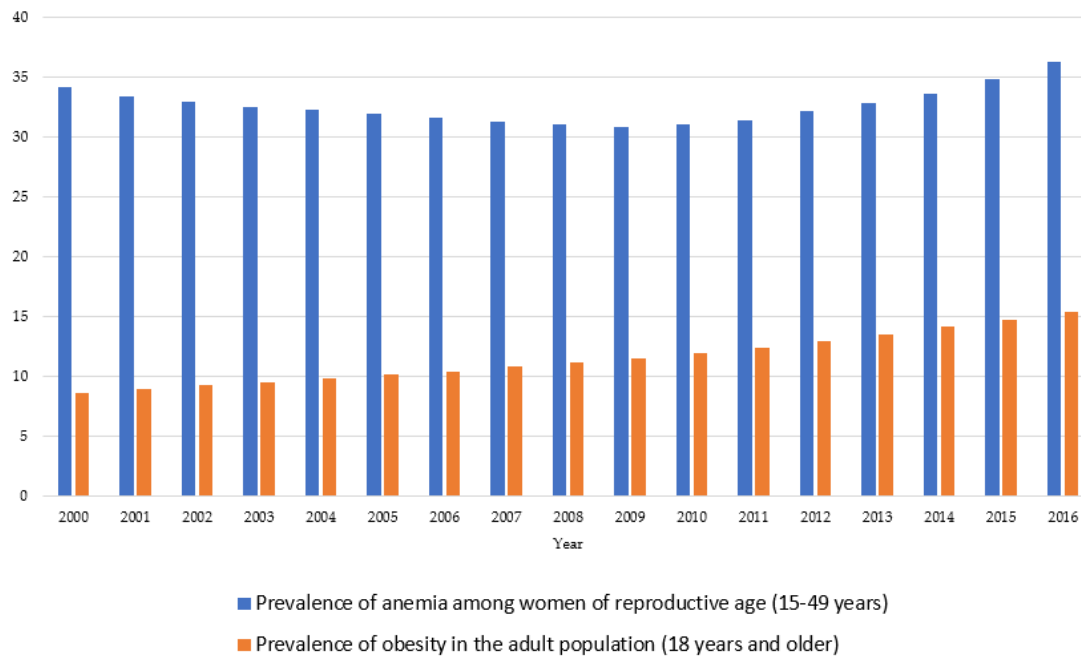


Figure 7. Prevalence of anemia and obesity in Kyrgyzstan [43].

Kyrgyz dietary patterns changed for almost last 30 years. Food balance sheet for the period from 1992 until 2018 demonstrate that per capita supply increased for certain food groups such as rice, potatoes, milk, beans, nuts, sunflowerseed oil, vegetables, fruits and fats. For the same period, it showed a slight decrease with short increases in some years for wheat products, sugar and meat (Figure 8). Energy intake for oils increased significantly from 20 kcal per person per day in 1992 to 99 kcal in 2018. Consumption of milk also increased from 270 kcal to 363 kcal per capita per day for the same period. The same trend is noticeable for rice and potato products from 17 and 125 kcal in 1992 to 43 and 172 kcal, respectively, for 1992–2018.

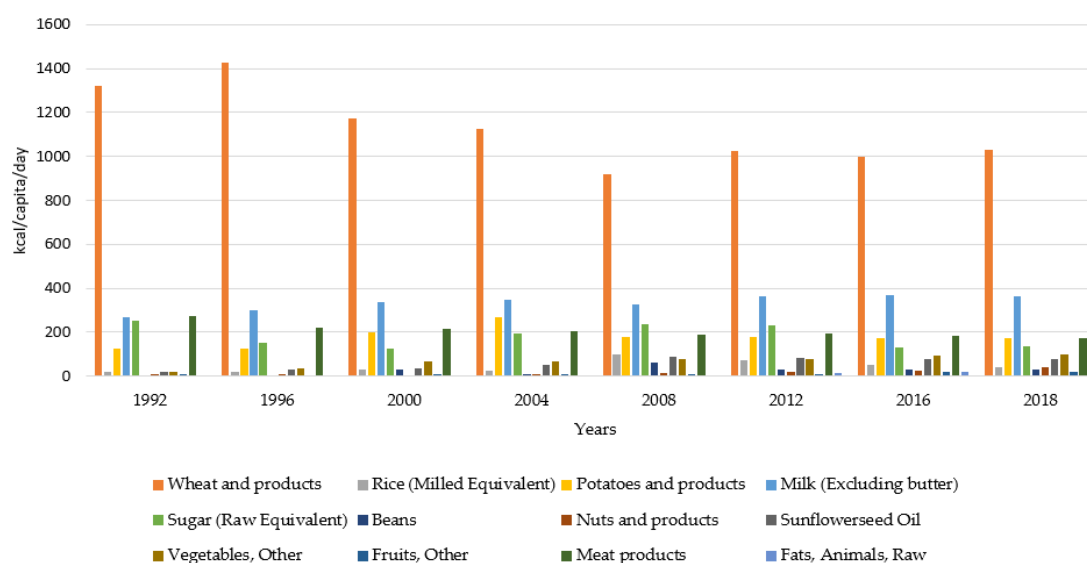


Figure 8. Food supply, Kyrgyzstan, 1992–2018 [49].

The results show that consumption of fat, carbohydrate and some animal-based products increased significantly over the last 30 years. Such diet practice coupled with limited physical activity leads to nutrition-related non-communicable diseases. Theory of nutrition transition states that during stage 4 infectious diseases decrease and non-communicable morbidities increase. This trend is obviously happening in Kyrgyz society (Figures 5 and 6) partly owing to the increasing levels obesity among adult population (Figure 7).

#### 4.3.1. Environmental Consequences

One of the legacies of Central Asia inherited by the Soviet planning is the Aral Sea's ecological catastrophe.

The plan to divert the main rivers of the Amu Darya and the Syr Darya was meant to increase food and cotton production leading to negative environmental consequences [50]. At the same time, besides the disastrous impact on the Central Asian region's ecology, the Soviet Union left unaffected walnut forest areas with some species of wild fruits. The Soviet Union perceived nut forests as an economic commodity [51]. However, wild forest plants have low productivity levels and depend on seasonal changes [52]. Among others, forests are significant sources for populations' nutritional security [35]. Communities living near these forests can gain significant nutritious value from wild plants and trees.

## 5. Discussion

Based on the observed literature and interview results of this research study, we believe that each politico-economic system that the Kyrgyz society has gone through in the past 170 years impacted nomadic food culture. Popkin's framework of nutrition transition explains stages of Kyrgyz nomads' transformation of food and diet changes. Table 5 demonstrates a general trend of nutrition transition taking place among Kyrgyz nomads. Each political period is not associated with the respective nutrition stage, but rather it is intended to show peculiarities each political system entails in relation to diet and nutrition.

**Table 5.** Characteristics of nutrition transition stages in three politico-economic systems (prepared based on the literature review).

Food and Nutrition Stages	Pre-Soviet Period	Soviet Union	Independence Era
Food Gathering	Cattle breeding, food gathering, hunting was a predominant occupation of local nomads.	People residing in rural areas continued food gathering to a lesser extent; cattle breeding became the predominant occupation. Reliance on social policies lessened the need for it.	Extremely limited in rural areas. Commercialisation allows knowledgeable/certified people to gather wild plants for income-generating purposes.
Famine	Harsh weather conditions during winter, tribal conflicts, cattle looting were taking place occasionally, leading to widespread hunger and starvation	The collectivisation of farms, large scale food production, food policies reduced famine substantially, except for the period of WWII when lack of food and other resources led to starvation	Hunger exists in very poor settings, in peri-urban and slum areas.
Receding Famine	Similar to the previous stage; locals nurtured themselves from traditional foods and wild plants, fermented beverages; limited irrigated and rainfed nomadic agriculture	Agriculture intensifies, per capita food production increases due to technological advancement; development of public nutrition; government subsidies for animal-based products	Intensification of agriculture continues; break down of farms collectivisation; small-scale farmers enter market relations; uncontrollable usage of artificial inputs in agriculture
Degenerative diseases	Degenerative diseases did not exist because of diet based on fibre, less fat and much physical activity	Since data are not available, it is hard to make an assessment	The number of communicable diseases diminishes, whereas the rates of non-communicable (e.g., cancer, cardiovascular diseases, diabetes etc.) increase

Besides daily physical activity, the traditional Kyrgyz diet included low fat, high complex carbohydrates and fibre [53]. One of the most characteristic features of the Kyrgyz diet was its seasonal nature [32]. In the warm season, food was based on dairy products, while in winter, food from flour and grain and meat prevailed, to which some milk products were added (cheese, butter, salted cottage cheese) [31,36]. Most of the population's concern was constant malnutrition, especially in winter; during the mass death of cattle, real hunger often ensued. "Indigenous nutrition can be described as culturally and bio regionally specific food-related knowledge that results in a dietary pattern meeting basic nutritional needs while avoiding Western diseases" [53] p. 421. Low in calories but nutrient-dense food are characteristics of the traditional diet of some people. The modern diet is, on the contrary, consists mostly of calorie-dense and nutrient-poor food. Wild foods can be rich in nutrients in comparison to cultivate plants [53]. Although data on decades' long consumption of certain food groups is unavailable, recent nutrition data suggest that diet changes are taking place. Consumption of cereals, roots and tubers are declining, whereas foods originating from the animal are increasing for the period of 2012–2018 [54].

A typical nomad's diet includes kymyz as an essential part of tradition and hospitality. Fermented food products have several benefits for human health. Kymyz has numerous health and nutritional properties due to the high content of vitamin A and phospholipids [58]. Modern science has proven that consumption of kymyz, among others, decreases risks for cardiovascular diseases thanks to its bacterial composition [56,57]. Mare's milk can also be quite nutritious for child nutrition [55]. In fact, similar to Mongols, Kyrgyz children consume kymyz starting at an early age. Rice is a hearty starch food after wheat in the Kyrgyz diet. Locally grown, *Ozgon rice* is red-brown colour rice with a unique taste, rich in minerals and micronutrients. Its speciality lies in local climatic conditions, soil content and farming [59].

Different historical developments in the northern and southern parts of the country had impacts on diets. Although division on three socio-economic periods is essential, regional food culture differences have their peculiarities [24]. Recent findings in the diet of the population of two regions revealed that northerners consume more meat, processed foods, fewer fruits and vegetables and more sugary food and drinks per day than southerners. This might be the reason for higher NCD rates among northerners in relation to the people living in the south. For the period of 2003 to 2018 number of obese people in the north increased from 95 to 368 per thousand people, whereas for the same timeframe, obesity in the south decreased from 35 to 26 per thousand people. Strokes also happen more frequently in the north (1282 persons) in comparison to the south (663 persons) per thousand people [54]. This might be due to the history of agriculture in the regions and ethnic composition which influenced food culture.

Kyrgyzstan's walnut forests are rich in nutritious plants that are rarely used by local communities [52]. Scientific evidence on the nutritional value of wild plants of Kyrgyzstan's walnut forest is limited for the moment [61]. Wild edible plants include wild apple, wild cherry or cherry plum, pistachio and almonds, barberry, wild pear [35], wild apricot, wild onion, black salt, sea buckthorn, brier, rhubarb and hawthorn, while even insects such as grasshopper were consumed. From the fruits of hawthorn, jams were made, and its dried leaves were used for tea. Morels are rich in proteins and minerals with low calories and are nutritious [60]. Most of them are mentioned in Table 6 with indications of nutrition value that have been studied before.

Studies on the nutritional values of locally available foods showed exciting insights. *Ozgon rice* (*Oryza sativa*), named after the cultivated place, is notable for its taste, colour, odour, and physical and nutrient composition [59]. Wild cherry plum has black, yellow, and red varieties and grows as a shrub or a tree in Kyrgyzstan's natural walnut forests. 26.4% of daily required iron can be obtained from 100 g of fresh wild cherry plum [61]. These wild berries and plants were probably consumed by nomads to meet nutritional needs and could be consumed nowadays to fight existing micronutrient deficiency among the local population.

**Table 6.** Nutritional composition of some food varieties in Kyrgyzstan [59,61–63].

Plant Varieties	Vernacular Name	Botanical Name	Nutritional Value (Per 100 g)
Grains	Ozgon rice	<i>Oryza sativa</i>	Moisture 9.23 mg, Carbohydrate 79.86 mg, Protein 8.53 mg, Fat 1.28 mg, Mg 55 mg, Ca 17.17 mg, K 55 mg, Fe 27.58 mg
Wild Fruits and Berries	Wild cherry plum	<i>Prunus divaricata</i> Ledeb.	Moisture 85 g, Potassium 128 mg, Calcium 14 mg, Copper 1.11 mg, Phosphorus 9 mg, Zink 0.18 mg
	Wild apples	<i>Malus sieversii</i>	Moisture 80.79 mg, Fibre 1.77 mg, Natrium 3.1 mg, Kalium 15.16 mg, Mag 1.95mg, Ca 12.43 mg, Mn 0.53 mg, Fe 2.32 mg, Cu 0.35 mg, Zn 0.18 mg, P 0.67 mg
	Wild pear	<i>Pyrus korshinski</i>	Moisture 70.18 mg, Fibre 8.76 mg, Na 2.42, K 177.54, Mg 2.21 mg, Ca 4.02 mg, Mn 0.49 mg, Fe 2.7 mg, Cu 0.81 mg, Zn 0.5 mg, P 6.92 mg
	Hawthorn	<i>Crataegus</i> spp.	Moisture 70.38 mg, Fibre 4.08 mg, Na 26.24 mg, K 403.62 mg, Mg 55.38 mg, Ca 213.32 mg, Mn 6.24 mg, Fe 2.34 mg, P 21.65 mg
	Rosehip	<i>Rosa canina</i>	Moisture 58.86 mg, Fibre 5.3 mg, Na 45.46 mg, K 466.35 mg, Mg 24.05 mg, Ca 46.08 mg, Mn 3.62 mg, Fe 11.62 mg, Cu 3.11 mg, Zn 5.44 mg, P 52.52 mg
Mushrooms	Barberry	<i>Berberis oblonga</i>	
	Morels	<i>Morchella esculenta</i> , <i>Morchella conica</i>	Not existing
Nuts	Walnut	<i>Juglans regia</i>	Ca141 mg, K 316.9 mg, Mg 165.9 mg, Zn 2.5 mg
	Pistachio	<i>Pistacia vera</i>	

## 6. Conclusions

The present study attempted to analyse historical development in relation to the nutrition transition that the Kyrgyz faced during the last 170 years. The modern Kyrgyz population's food regime was influenced by the profound transformations of the socio-economic structure, altering food culture and especially the transition of former nomads to the sedentary lifestyle. Theory of nutrition transition gives us methodological basis to understand change in diet patterns through change of social transformations. Three political and economic systems that have prevailed over society put inevitable consequences on the nomads' diet and lifestyle. Annexation to the Soviet Union went hand in hand with urbanisation and thus settlement. Living shoulder to shoulder with representatives of different ethnicities enriched the traditional food of the Kyrgyz. Simultaneously, the expansion of relations with the city and the neighbouring Russian, Uzbek, Tajik, Dungan and Uigur populations affected food types. This is especially noticeable in the Issyk-Kul region, in the Chuy Valley, in southern Kyrgyzstan. Although the food maintains its national character and its preparation methods, it has not undergone significant changes. Still, new and unfamiliar dishes appeared in it; it has become diverse. Food was enriched mainly in connection with developing new sectors of the economy, almost unknown to nomads before: horticulture, gardening, beekeeping, poultry farming.

Nutrition shifts have occurred increasing preference to Western-type diet with political independence since 1991. Entering of global corporations, the shift from subsistence to market economy, trade liberalization led to the preference of the readily available and easily made highly processed food. Based on the literature we argued that the higher intake of processed food, fats, sweets, and animal products impacted the nutritional status.



It has increased obesity levels among adult population while leaving vulnerable parts of the population micronutrient deficient. Coupled with less physical activity, this diet culture impacts the health of population leading to cancer, heart diseases, diabetes and other non-communicable diseases. The paper also explored forgotten and neglected plants, foods and drinks which are nutrient dense and mostly grow freely in nature and are part of traditional cuisine. These locally available foods should be included in the government nutritional programs to fight current malnutrition's triple burden.

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