OVERVIEW OF FOOD SECURITY AND NUTRITION IN KAZAKHSTAN 2021

Progress towards the 2030 Sustainable Development Goals
This report is prepared by the Food and Agriculture Organization of the United Nations and the Coalition for Green Economy and Development of G-Global in Kazakhstan under the Technical Support Programme Facility (TCPF) project “Supporting the nationalization of Sustainable Development Goals in Kazakhstan” (TCP/KAZ/3702) with aim to present an overview of food security and nutrition situation in Kazakhstan. The analysis provided in the report is based on the latest data from the State of Food Security and Nutrition in the World (SOFI) and Bureau of National Statistics in Kazakhstan.
OVERVIEW OF FOOD SECURITY AND NUTRITION IN KAZAKHSTAN 2021

Progress towards the 2030 Sustainable Development Goals

Food and Agriculture Organization of the United Nations
Nur-Sultan, 2022
PART 1. THE CONCEPT OF FOOD SECURITY

1.1. Global definition of food security

The Rome Declaration on World Food Security in 1996 defines food security as a condition when “all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life”. For a food secure situation to be established, four conditions need to be satisfied simultaneously. First, food needs to be available for consumption; second, people should have the means to access food; third, food needs to be consumed in a healthy consumption environment in order for people to fully utilize the nutrients it contains; and fourth, all the processes involved should be stable for a foreseeable period of time.

These four conditions constitute the foundation for diverse pathways to food security. Food availability concerns the availability of sufficient food of appropriate quality, supplied through domestic production, imports and food aid.

FIGURE 1. THE FOUR DIMENSIONS OF FOOD SECURITY

*All people, at all times, have physical, social and economic access to sufficient, safe and nutritious food, which meets their dietary needs and food preferences for an active and healthy life.*

01 STABILITY
Ensured when there is permanent and durable access to food

02 AVAILABILITY
Ensured when there is a reliable supply of food of sufficient quantity and quality

03 UTILIZATION
Ensured when food is nutritious and can be adequately used by the body

04 ACCESS
Ensured when individuals/households have adequate resources to obtain appropriate food

Food access involves individuals’ physical, social and economic access to adequate food through the income and entitlements necessary to acquire appropriate food for a nutritious diet. Food utilization relates to the utilization of food through adequate diet, clean water, sanitation and health care to attain a state of nutritional well-being where all physiological needs are met. The environment in which food is consumed plays a critical role in the absorption of nutrients. Stability refers to the continuity and sustainability of all optimal pathways leading to a food secure situation for all people, at all times. People should not risk losing access to food as a consequence of economic, social and natural shocks or cyclical events.

1.2. Linkage between food security and nutrition

Malnutrition is a complex condition that results from the interaction of multiple factors, including lack of sufficient food, diseases, unsafe public health conditions among others. Escaping from malnutrition requires sufficient food consumption for human survival, adequate income to access safe and nutritious food, environment for the effective utilization of food. The conceptual framework of nutrition (Figure 2) illustrates these multifactorial determinants of malnutrition.

![Figure 2: The Conceptual Framework of Nutrition](image-url)

1.3. Indicators to measure food security and nutrition

A standalone indicator such as food self-sufficiency or the prevalence of hunger cannot capture the multidimensionality of food security, as defined above. Each food security dimension is described by specific indicators. A broad agreement on the suite of indicators for measuring food security has been reached on the indicators given in Table 1.

### Table 1. The Suite of Food Security Indicators

<table>
<thead>
<tr>
<th>Food security indicators</th>
<th>Dimension</th>
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<tbody>
<tr>
<td>Average dietary energy supply adequacy</td>
<td>Availability</td>
</tr>
<tr>
<td>Average value of food production</td>
<td></td>
</tr>
<tr>
<td>Share of dietary energy supply derived from cereals, roots and tubers</td>
<td></td>
</tr>
<tr>
<td>Average protein supply</td>
<td></td>
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<tr>
<td>Average supply of protein of animal origin</td>
<td></td>
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<tr>
<td>Percentage of paved roads over total roads</td>
<td>Physical access</td>
</tr>
<tr>
<td>Road density</td>
<td></td>
</tr>
<tr>
<td>Rail lines density</td>
<td></td>
</tr>
<tr>
<td>Domestic food price index</td>
<td>Economic access</td>
</tr>
<tr>
<td>Access to improved water sources</td>
<td>Utilization</td>
</tr>
<tr>
<td>Access to improved sanitation facilities</td>
<td></td>
</tr>
<tr>
<td>Cereal import dependency ratio</td>
<td>Vulnerability</td>
</tr>
<tr>
<td>Percentage of arable land equipped for irrigation</td>
<td></td>
</tr>
<tr>
<td>Value of food imports over total merchandise exports</td>
<td></td>
</tr>
<tr>
<td>Political stability and absence of violence/terrorism</td>
<td>Shocks</td>
</tr>
<tr>
<td>Domestic food price volatility</td>
<td></td>
</tr>
<tr>
<td>Per capita food production variability</td>
<td></td>
</tr>
<tr>
<td>Per capita food supply variability</td>
<td></td>
</tr>
<tr>
<td>Prevalence of undernourishment</td>
<td>Access</td>
</tr>
<tr>
<td>Share of food expenditure of the poor</td>
<td></td>
</tr>
<tr>
<td>Depth of the food deficit</td>
<td></td>
</tr>
<tr>
<td>Prevalence of food inadequacy</td>
<td></td>
</tr>
<tr>
<td>Percentage of children under five years of age affected by wasting</td>
<td>Utilization</td>
</tr>
<tr>
<td>Percentage of children under five years of age who are stunted</td>
<td></td>
</tr>
<tr>
<td>Percentage of children under five years of age who are underweight</td>
<td></td>
</tr>
<tr>
<td>Percentage of adults who are stunted</td>
<td></td>
</tr>
<tr>
<td>Prevalence of anaemia among pregnant women</td>
<td></td>
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<tr>
<td>Prevalence of anaemia among children under five years of age</td>
<td></td>
</tr>
<tr>
<td>Prevalence of vitamin A deficiency (forthcoming)</td>
<td></td>
</tr>
<tr>
<td>Prevalence of iodine deficiency (forthcoming)</td>
<td></td>
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</tbody>
</table>

1.4. Food security and nutrition in the Sustainable Development Goals

Food security and nutrition are central to the United Nations 2030 Agenda for Sustainable Development, which consists of 17 Sustainable Development Goals (SDGs). Food security and nutrition targets are unified under a single Sustainable Development Goal (SDG) 2 (see Table 2), which calls on countries to “end hunger, achieve food security and improved nutrition and promote sustainable agriculture by 2030.” SDG 2 incorporates eight closely related targets, which are closely related to one another. For instance, in contexts where many of the food insecure depend on agriculture for a living, improvements in agricultural productivity and the incomes of small-scale food producers (Target 2.3) will act as a vehicle to improve access to food (Target 2.1). Making agriculture more resilient and sustainable (Target 2.4) will in turn strongly influence the future availability and stability of food supplies (Targets 2.3 and 2.4). Together, improvements towards Targets 2.3, 2.4 and 2.1 will underpin progress towards Target 2.2, which aims to “end all forms of malnutrition, including achieving, by 2025, the internationally agreed targets on stunting and wasting in children under five years of age, and address the nutritional needs of adolescent girls, pregnant and lactating women and older persons.” Monitoring progress towards SDG 2 targets therefore goes beyond the simple tracking of SDG 2 indicators; it requires an improved understanding of the causal interactions among the determinants of SDG 2 targets.

<table>
<thead>
<tr>
<th>SDG 2 targets</th>
<th>SDG 2 indicators</th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>2.1</strong> By 2030, end hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious and sufficient food all year round</td>
<td><strong>2.1.1</strong> Prevalence of undernourishment</td>
<td><strong>2.1.2</strong> Prevalence of moderate or severe food insecurity in the population, based on the Food Insecurity Experience Scale (FIES)</td>
</tr>
<tr>
<td><strong>2.2</strong> By 2030, end all forms of malnutrition, including achieving, by 2025, the internationally agreed targets on stunting and wasting in children under five years of age, and address the nutritional needs of adolescent girls, pregnant and lactating women and older persons</td>
<td><strong>2.2.1</strong> Prevalence of stunting (height for age &lt;-2 standard deviation from the median of the World Health Organization (WHO) Child Growth Standards) among children under five years of age</td>
<td><strong>2.2.2</strong> Prevalence of malnutrition (weight for height &gt;+2 or &lt;-2 standard deviation from the median of the WHO Child Growth Standards) among children under five years of age, by type (wasting and overweight)</td>
</tr>
</tbody>
</table>

### TABLE 2. OBJECTIVES AND INDICATORS OF THE FOOD SECURITY AND NUTRITION-RELATED SDGS (PART 2/2)

<table>
<thead>
<tr>
<th>SDG 2 targets</th>
<th>SDG 2 indicators</th>
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| **2.3** By 2030, double the agricultural productivity and incomes of small-scale food producers, in particular women, indigenous peoples, family farmers, pastoralists and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets and opportunities for value addition and non-farm employment | **2.3.1** Volume of production per labour unit by classes of farming/pastoral/forestry enterprise size  
**2.3.2** Average income of small-scale food producers, by sex and indigenous status |
| **2.4** By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality | **2.4.1** Proportion of agricultural area under productive and sustainable agriculture |
| **2.5** By 2020, maintain the genetic diversity of seeds, cultivated plants and farmed and domesticated animals and their related wild species, including through soundly managed and diversified seed and plant banks at the national, regional and international levels, and promote access to and fair and equitable sharing of benefits arising from the utilization of genetic resources and associated traditional knowledge, as internationally agreed | **2.5.1** Number of plant and animal genetic resources for food and agriculture secured in either medium or long-term conservation facilities  
**2.5.2** Proportion of local breeds classified as being at risk, not-at-risk or at unknown level of risk of extinction |
| **2.A** Increase investment, including through enhanced international cooperation, in rural infrastructure, agricultural research and extension services, technology development and plant and livestock gene banks in order to enhance agricultural productive capacity in developing countries, in particular least developed countries | **2.A.1** The agriculture orientation index for government expenditures  
**2.A.2** Total official flows (official development assistance plus other official flows) to the agriculture sector |
| **2.B** Correct and prevent trade restrictions and distortions in world agricultural markets, including through the parallel elimination of all forms of agricultural export subsidies and all export measures with equivalent effect, in accordance with the mandate of the Doha Development Round | **2.B.1** Producer support estimate  
**2.B.2** Agricultural export subsidies |
| **2.C** Adopt measures to ensure the proper functioning of food commodity markets and their derivatives and facilitate timely access to market information, including on food reserves, in order to help limit extreme food price volatility | **2.C.1** Indicator of food price anomalies |

PART 1 THE CONCEPT OF FOOD SECURITY

The concepts of food self-sufficiency and food security differ in several respects. The former considers national production as the only source of food supply, while the latter takes into account food imports and aid. In addition, the former concerns the availability at the national level of domestically produced food only, while the latter addresses the stability of food supply, access and consumption by the population.

The concept of food self-sufficiency is generally understood as the extent to which a country can satisfy its food needs from its own domestic production. Until the 1980s, food security policies in many countries focused on self-sufficiency of staple food. Such a focus can be seen in the context of food shortages in the early and mid-twentieth century caused by the disruption of agricultural production and international trade during and after the Second World War. Some assert that the best way to increase a country’s food security level is to increase its level of self-sufficiency in regard to staple food, on the grounds that a country may have more control over its food supply if it is not dependent on international markets.

However, self-sufficiency in staple food may not advance food security. The national staple self-sufficiency rate can increase not only through growth in production but also as a result of stagnant consumption levels caused by low population purchasing power (poverty). For example, India has achieved self-sufficiency in wheat and rice, but malnutrition remains widespread.

BOX 1. FOOD SELF-SUFFICIENCY AND FOOD SECURITY

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PART 2. THE CURRENT STATUS OF FOOD SECURITY IN KAZAKHSTAN

2.1. Food availability

Overall food availability measured by per capita dietary energy supply

The amount of available foods, measured as calories per day per person, has increased substantially in Kazakhstan. Figure 3 and 4 shows that improvement in food supply in terms of dietary energy supply (DES) has been achieved despite the substantial population growth in the last 20 years. This indicates that the amount of foods available grew faster than population growth. In 2020, an estimated per capita DES reached around 3 100 kcal per day which by far exceeds the minimum dietary energy requirement of an average adult.
Changes in supply of key food items (2000-2018)

While the aggregated overall food supply measured by per capita dietary energy supply remain high and unchanged during the last decade, the composition of dietary energy supply shows a significant change. Kazakhstan reduced the per capita supply of cereals and roots and increased the supply of both protein and fat. The change entails important implications for the food security and nutrition situation through changes that would potentially affect both environment and human nutrition.
Public support for agricultural productivity (SDG 2 Indicator 2.a.1)

Increasing agricultural investment (SDG 2 Target 2.A) should enhance productive capacity if policies support agricultural research and extension services, technology development, and plant and livestock gene banks. The agriculture orientation index, defined as the ratio of the share of government expenditures on agriculture to the sector’s share of GDP, is a key SDG 2 indicator used to monitor investment in agriculture. The trend in Kazakhstan shows that agriculture received consistent attention from policy-makers, as indicated by the consistently increasing values for the last two decades. The values are among the highest in Central Asia region.

**Figure 5. Agriculture Orientation Index for Government Expenditures**

2.2. Food access

Prevalence of undernourishment (SDG indicator 2.1.1)

SDG Target 2.1 aims to ‘end hunger by 2030 and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious and sufficient food all year round’. The evolution of progress towards zero hunger is monitored through the use of two SDG indicators (2.1.1 and 2.1.2). Indicator 2.1.1 measures the prevalence of undernourishment (PoU), defined as the proportion of undernourished people relative to total population. It approximates the degree of inadequacy of energy intake of a person in relation to the required energy intake.

Kazakhstan significantly reduced the prevalence of undernourishment in the last two decades. Figure 6 shows that around 5 percent of the population in Kazakhstan was undernourished in 2000, but the prevalence has steadily reduced since and successfully reduced since mid-2000s. In recent years, the prevalence is estimated to be lower than 2.5 percent.

This is consistent with the results from the national household sample surveys. An estimated 3.6 percent of the population in Kazakhstan were unable to fulfill the minimum dietary energy requirement in 2017. This is equivalent to around 645,700 people.

\[\text{Express information On the energy value of food consumed by the population of the Republic of Kazakhstan No._36-8 / 231, June 28, 2018.}\]

**FIGURE 6. PREVALENCE OF UNDERNOURISHMENT (%)**

![Bar chart showing the prevalence of undernourishment in Kazakhstan from 2000 to 2020. The prevalence has steadily reduced from 6.5% in 2000 to 2.5% in 2020.](image)

Note: Bars in grey signify a prevalence of undernourishment below 2.5%.

Population living below the national poverty line (SDG indicator 1.2.1)

Food and nutrition insecurity is a complex condition that results from the interaction of multiple factors, including not only insufficient food availability for consumption but also poverty. Poverty seriously affects household access to adequate amounts of nutritious food. Poverty-stricken people are highly vulnerable to rises in food prices, economic downturn or any other socio-economic shocks. Meeting SDG 2 calls for the reduction of poverty through the implementation of pro-poor and inclusive growth.

Kazakhstan achieved a significant reduction of poverty from 12.7 percent in 2007 to 2.5 percent in 2016. However, it showed an increasing trend since 2018 and reached 5.3 percent in 2020. The poverty ratio is increasing in both urban and rural areas, but it is higher in rural area. This is a worrying trend which could lead to an increase in food insecurity, particularly economic access to food.

A clear geographical disparity was also observed between the oblasts. In 2020, seven oblasts (Turkestan, North Kazakhstan, East Kazakhstan, Akmolinskaya, Zhambylskaya, Kyzylordinskaya and Mangistauska) had poverty levels higher than the national average, with Turkestan oblast having a significantly higher proportion of the poor at some 12 percent.

FIGURE 8. POPULATION LIVING BELOW THE NATIONAL POVERTY LINE (URBAN AND RURAL, %)


FIGURE 9. POPULATION LIVING BELOW THE NATIONAL POVERTY LINE (BY OBLAST IN 2020, %)

**Indicator of food price anomalies** *(SDG indicator 2.c.1)*

Increases in food prices reduce the purchasing power of consumers by depressing real incomes. The Indicator of Food Price Anomalies (IFPA) measures the number of ‘Price Anomalies’ that occur on a given food commodity price series over a given period of time. This indicator will measure progress towards SDG Target 2.c ‘Adopt measures to ensure the proper functioning of food commodity markets and their derivatives and facilitate timely access to market information, including on food reserves, in order to help limit extreme food price volatility’. This indicator helps ensure appropriate measures can be taken to offset the hikes in food prices.

Kazakhstan rarely experienced abnormal levels of food price anomalies since 2010. However, the prices of wheat flour increased in 2019 and 2020, likely due to a reduced domestic production, increased import and depreciated national currency.

**FIGURE 10. INDICATOR OF FOOD PRICE ANOMALIES (SDG INDICATOR 2.C.1)**

For an average household in Kazakhstan, food is the biggest expenditure for households. On average, around half of the total household expenditures are allocated for purchasing food. The proportion has been steadily increasing for the last several years. In 2020, the proportion increased by nearly 4 percent compared to the previous year.

**FIGURE 11. HOUSEHOLD EXPENDITURE (%)**

![Household Expenditure Chart]


**2.3 Food utilization and nutrition**

**Daily per capita dietary energy consumption (kcal/person/day)**

The average daily per capita dietary energy consumption is well above the minimum daily recommended requirement. The dietary energy consumption increased by around 7 percent between 2016 and 2020, despite the increased cost of food basket and the effects of the COVID-19 pandemic. This reflects an increased consumption of energy-dense products such as eggs, potatoes, chicken and processed meat products. On average, consumption of eggs has increased by 18 percent. The consumption of sugar, vegetables and beef has reduced during the same period.
**FIGURE 12. DAILY PER CAPITA DIETARY ENERGY CONSUMPTION (KCAL/PERSON/DAY)**

![bar chart showing daily per capita dietary energy consumption from 2017 to 2020](chart)


**FIGURE 13. CHANGES IN PER CAPITA FOOD CONSUMPTION BETWEEN 2016 AND 2020 (KG/PERSON/YEAR)**

![bar chart showing changes in per capita food consumption](chart)

Sale of ‘ultra-processed foods’ per capita

Ultra-processed foods are formulations of ingredients, mostly of exclusive industrial use, typically created by series of industrial techniques and processes. Some common ultra-processed products are carbonated soft drinks; sweet, fatty or salty packaged snacks; candies (confectionery); mass produced packaged breads and buns, cookies (biscuits), pastries, cakes and cake mixes; margarine and other spreads; sweetened breakfast ‘cereals’ and fruit yoghurt and ‘energy’ drinks; pre-prepared meat, cheese, pasta and pizza dishes; poultry and fish ‘nuggets’ and ‘sticks’; sausages, burgers, hot dogs and other reconstituted meat products; powdered and packaged ‘instant’ soups, noodles and desserts; baby formula; and many other types of product (FAO 2019). Reserches reveale significant associations between the dietary share of ultra-processed foods and dietary nutrient profiles prone to non-communicable diseases, including high or excessive content of free or added sugar, saturated and trans fats, and sodium, and also high dietary energy density; and low or insufficient content of protein, fibre and potassium. Furthermore, the results from the studies on health outcomes show plausible, significant and graded associations between the dietary share of ultra-processed foods and the occurrence or incidence of several non-communicable diseases, including obesity and obesity-related outcomes, cardiovascular and metabolic diseases, breast and all cancers, depression, gastrointestinal disorders, frailty in the elderly, and also premature mortality (FAO 2019).

In Kazakhstan, an average per capita sale of ultra-processed foods was 199 USD in 2018. The sales has increased from 194 in 2017 and higher than the average sale in the countries of Central Asia (Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan) and close to the world average. The number of supermarkets, which are dominant distribution channels for ultra-processed foods, also increased by 25 percent between 2013 and 2018.
Prevalence of child malnutrition (SDG indicator 2.2.1 and 2.2.2)

During the last two decades, Kazakhstan recorded significant reductions in the prevalence of stunting (growth failure) and wasting (acute undernutrition) among children under five years old. However, the prevalence of overweight among the same group remains relatively high, exceeding the world average.

Prevalence of anaemia among women in reproductive age (SDG indicator 2.2.3)

The anemia has declined in Kazakhstan until 2013, but thereafter it reversed with an upsurge. The prevalence in 2019 was estimated at 37.8 percent. Anemia is a health threat for mothers and indirectly to child health through less time spent on child care.

**FIGURE 15. ESTIMATED PREVALENCE OF CHILDREN UNDER FIVE YEARS OF AGE WHO ARE STUNTED (SDG INDICATOR 2.2.2)**

![Graph showing estimated prevalence of stunted children from 2000 to 2020.](source)


**FIGURE 16. ESTIMATED PREVALENCE OF ANAEMIA AMONG WOMEN IN REPRODUCTIVE AGE (SDG INDICATOR 2.2.3)**

![Graph showing estimated prevalence of anaemia among women from 2000 to 2020.](source)

Prevalence of obesity among adults

Kazakhstan shows an alarming level of obesity. With the estimated prevalence around 21 percent in 2016, the rate is the highest in Central Asian countries and significantly higher than the world average.

2.4 Stability of food security

Cereal import dependency

High cereal import dependency is an important source of instability in food availability, as it creates vulnerability to external shocks such as global food and financial crisis which have consequences for affordability of staple foods particularly among low income households. Kazakhstan has been a net exporter of cereals.
Share of food imports in total exports

The share of food imports in total exports is an indicator of the adequacy of foreign exchange reserves to reimburse the cost for food imports. A low share of food import in total export is observed in Kazakhstan, indicating a high level of capacity to continue to finance the food imports for the population.

**FIGURE 19. VALUE OF FOOD IMPORTS IN TOTAL MERCHANDISE EXPORTS (PERCENT) (THREE-YEAR AVERAGE)**


PART 3. KEY CONSIDERATIONS FOR FOOD SECURITY POLICIES

Increasing populations mean higher demand for food in the future

The total population of Kazakhstan increased by about 4 million in the last two decades, and it is estimated to increase by another 2 million in 2030. The growth rate is higher than the average growth of upper-middle income countries. This exerts continued pressure on overall food supply and food-related public services such as school meals and social protection, which needs to be met by increased supply from domestic production or trade. Increasing domestic production would in turn place extra strain on agricultural resources inputs, seeds and fertilizers, as well as the environment. Sustainable agricultural practices should therefore be adopted
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to ensure the food supply for current and future generations.

Urbanization and rising incomes provoke changes in food consumption patterns

With an urbanization rate of 58 percent, it is expected that people’s income levels will continue to rise in Kazakhstan. According to the latest projection by the International Monetary Fund, per capita GDP is estimated to increase by nearly 40 percent by 2030. Combined with sedentary lifestyles in urban areas, higher purchasing power would mean easier access to food, especially prepared food and highly processed, nutritionally low-quality food, due to the higher opportunity cost of time in urban areas. This would accelerate the shift in food consumption away from cereals towards high-calorie food items such as processed meat, chicken, eggs. Such trends have already been seen in recent years (see Figure 13 and 14).

Changing pattern of food demand could lead to deterioration of human nutrition and health

The over-consumption of food, coupled with increasingly sedentary lifestyles, would lead to a higher numbers of people who are overweight and obese. The number of obese adults and overweight children under five years of age is already showing an upward trend. The factors behind such changes in food consumption pattern are complex, and range from biological needs to economic, culture and social changes. Food and nutrition policies should aim at behavioral changes among consumers to shift dietary patterns to the benefit of human health and environment. Inclusive economic growth strategies are also important as nutritious and healthy diets tend to be more expensive than calorie-dense and less nutritious diets.

Changing pattern of food demand could result in environmental degradation

The shift in food consumption pattern towards high value and high calorie food such as meat, chicken and eggs (Figure 13) and ultra-processed foods (Figure 14) has important implications for food security and nutrition policies in Kazakhstan. Food production and trade policies need to respond to such shifts by reorienting of the use of agricultural endowments and food trade policies. These could also have impact on environment since diets with higher consumption of meat, chicken and eggs lead to environmental degradation and CO2 gas emissions.
REFERENCES AND DATA SOURCES


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