

**TOWARDS SUSTAINABLE FOOD SYSTEMS
NATIONAL PATHWAY OF TURKEY**

DRAFT

September 2021

FORWARD

The population of 7.8 billion is estimated to reach nearly 10 billion people by 2050, according to UN sources. Every year, approximately 931 million tons of food is wasted at the global level, in other words, it goes to waste. This means that 17% of global food production could go to waste, of which 61% comes from the domestic sector, 26% from the food service and 13% from the retail sector. According to UN sources, 8-10% of global carbon emissions are related to unconsumed food. According to The State of Food and Agriculture Report, The COVID-19 pandemic has pushed an additional 83-132 million into chronic hunger in 2020, putting a spotlight on the vulnerability of the world's food systems. At the same time, fourteen percent of the food we do manage to produce is lost and even more wasted. Child stunting remains high as well and in 2019, over 21 percent (144 million) of children under 5 years of age were stunted. Child overweight is also not improving, with about 38 million, or 5.6 percent, of children being overweight. Changes in diet and increasing demand for food of animal origin put a growing burden on all-natural resources, including valuable farmland. Animal husbandry crucial for healthy nutrition produces higher greenhouse emission and its possible impacts on the environment. The trade-off situation needs to be lessened.

One of the commitments of Turkey will be reduction of food loss and waste, and Turkey remains committed to addressing food loss and waste as part of the country's ambition to have fair and healthy food for all its population by 2030. Furthermore, Turkey will continue the implementation of School Nutrition, School Milk and School Food Programs since feeding the next generation with nutritious food will play a vital role in the sustainable food systems. Moreover, Turkey preserve its commitment to perform actions and main actions as a result of 3rd Agriculture and Forestry Council in line with the Summit. Turkey also commit to perform actions and main actions as a result of Water Council in line with the Summit. Water Council results will be declared to the public. Turkey also commits to differentiate the diets in order to lessen the malnutrition along with the other ones. Turkey's priorities take place in following

- Protection and Sustainable Use of Environment and Natural Resources
- Transition to Sustainable Consumption and Prevention of Food Loss and Waste
- Food Security
- Public Health and Food Safety
- Inclusive Sustainable Food Systems and Poverty Alleviation
- Increasing the Resilience of Sustainable Food Systems Against Food Crises

National Pathway of Turkey for Food Systems addresses how the food systems are expected to be transformed to provide healthy diets for all, mitigating climate change, protecting the biodiversity, improving the food chain by protecting small holders in a sustainable way.

ABBREVIATIONS

ASELSAN: Military Electronic Industries

BSEC: Black Sea Economic Cooperation Organization

COMCEC: The Standing Committee for Economic and Commercial Cooperation of the Organization of the Islamic Cooperation

FAO: Food and Agriculture Organization

FLW: Food Loss and Waste

GDP: Gross Domestic Product

IOFS: Islamic Organization for Food Security

MoAF: The Ministry of Agriculture and Forestry

MoENR: The Ministry of Energy and Natural Resources

MoFSS: The Ministry of Family and Social Services

MoH: The Ministry of Health

NCCAP: National Climate Change Action Plan

LULUCF: Land Use, Land Use Change and Forestry

SDGs: Sustainable Development Goals

PPSs: Purchasing Power Parities

TİKA: Turkey, Turkish Cooperation and Coordination Agency

UN: United Nations

UNFSS: United Nations Food System

WWF: World Wildlife Fund

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EXECUTIVE SUMMARY

UN Secretary-General will convene a Food Systems Summit so as to maximize the co-benefits of a food systems approach across the entire 2030 Agenda. The summit aims to provide a platform for ambitious new actions including innovative solutions on food systems from countries. The objectives of the Summit are as follow;

- Raise awareness of food systems' centrality to the entire sustainable development agenda, and the urgency of transforming food systems, particularly in the wake of a global pandemic;
- Align stakeholders around a common understanding and narrative of a food system framework as a foundation for concerted action, making food and food systems a more widespread issue for advocacy and action to achieve the 2030 Agenda;
- Recognize the need for inclusivity and innovation in food systems governance and action;
- Motivate and empower stakeholders who support food systems transformation through the development of improved tools, measurement, and analysis; and
- Catalyse, accelerate, and enlarge bold action for the transformation of food systems by all communities, including countries, cities, companies, civil society, citizens, and food producers.

In the framework of the Food Systems Summit, 5 main action tracks have been identified. These are;

Action Track 1 (AT1): Ensure Access to Safe and Nutritious Food for All

Action Track 2 (AT2): Shift to Sustainable Consumption Pattern

Action Track 3 (AT3): Boost Nature Positive Production at Sufficient Scale

Action Track 4 (AT4): Advance Equitable Livelihoods

Action Track 5 (AT5): Build Resilience to Vulnerabilities, Shocks & Stresses

Among these actions, Turkey has made a significant contribution for the Action Track 2 and 5 at global level. However, a national dialog process is conducted for all five action tracks in Turkey. In 2019, a sustainable food system country report was prepared by the Ministry of Agriculture and Forestry in consultation with some different stakeholders and it was updated with the stakeholder's opinion within scope of UNFSS. The current situation and the elements of sustainable food systems were reflected in this report. Also, a report including the main problems and solutions in sustainable food systems was prepared as a result of outputs of national dialogues.

The national preparation process for the UN 2021 Food Systems Summit was carried out with a participatory approach under the coordination of Aylin ÇAĞLAYAN ÖZCAN, General Director for European Union and Foreign Relations at the Ministry of Agriculture and Forestry. She was designated as the National Dialogues Convenor on behalf of Turkey. In this context,

the dialogue process, which was planned in three stages as member country dialogues, global dialogues and independent dialogues, was conducted between November 2020 and September 2021. This national pathway is prepared on the basis of the outputs of all the dialog processes in accordance with Turkey's national strategy and policies in relation to food system components.

INTRODUCTION

A food system is defined by WWF (2018) as a system covering the activities that relate to production, processing, transport, and consumption, and grasping all the elements of environment, people, inputs, processes, infrastructure, institutions, markets and trade and consumption of food and outputs of these activities covering socio-economic and environmental outcomes.

A growing population, food loss and waste, climate change, changing consumer patterns as a result of changing socio-economic conditions create a threat for food systems. In spite of the fact that the world produces sufficient food for all people, 840 million people go hungry according to estimations for 2030 and 2 billion are malnourished because of the lack of a perfect food system in the world. While the population increases exponentially, the average size of agricultural holdings is expected to decrease. So, there is a need to increase environmentally friendly production at sufficient scale in the next decade.

In Turkey, total utilized agricultural land is 37,762,000 hectares of which 41.4 % consists of area of cereals and crop products. The rate of area of fruits, beverage and spice crops has increased by 36.4 % in the years of 2001-2020 while sown areas for cereals decreased to 12.8 % in the same years. Primary agriculture accounts for 6,7 % of GDP and employs 16 % of the workforce.

Regarding agricultural producers' status, there are 2,306,305 farmers according to the farmers register system and 82,6 % of the agricultural holdings are under 100 da. in Turkey. The number of agricultural holdings over 200 da. is only 6,4 %.

Small scale farmers, particularly fruit and vegetable producers as well as fish producers, have difficulty to access the market since their products are perishable. So, cooperative marketing seems one of the most effective ways for those groups to handle marketing problems and provide a livelihood. The number of members of cooperatives is 3.5 million. The fact that there is a significant number of cooperative members in Turkey however regarding the institutional capacity of agricultural cooperatives, there is still some room to progress.

There is a rapid migration from rural areas to urban areas in Turkey. The rate of urbanization is over 75 % and is expected to be over 80 % in the next decade. There is thus a shift from producer society to urban society.

With respect to migration, Turkey hosts around 45 percent of all Syrian refugees in the region due to the regional instability. Providing viable livelihood opportunities in agriculture to cope with the crises is one of the key elements of the Syrian Refugee Resilience Plan prepared by FAO, covering 2019-2020.

According to the Food Security Index, Turkey is a strong country regarding proportion of population under the global poverty line, sufficiency of supply, micronutrient availability, market access and agricultural financial services, food safety, protein quality and food safety net programs. Turkey is self-sufficient in many crops and fruit and vegetables. However, the losses in harvest and post-harvest are so high. The most important harvest losses are seen in tea with 15% and wheat with 5,1%.

The Waste Report prepared by the Ministry of Trade stated that 5.4% of the consumers throw away the leftover food and 23% of the purchased food is thrown away without being consumed. In order to reduce food loss and waste “SAVE YOUR FOOD” campaign was launched under the Ministry of Agriculture and Forestry in cooperation with FAO.

According to FAO statistics, average protein supply in Turkey increased to 109.3 g/capita/day in the period of 2016-2018 from 103.7 g/capita/day in the period of 2000-2002. Average supply of protein of animal origin significantly increased to 37.7 g/capita/day in 2016-2018 from 24.3 g/capita/day in the period of 2000-2002.

The main health problems in Turkey which are related to malnutrition detected in research, are protein-energy malnutrition in children, prevalence of obesity among adults and children. Excessive use of salt, lack of vitamins of B1, B2, B6 and D and also some minerals such as calcium, magnesium, iron, zinc and potassium are main causes of nutritious related health problems.

Turkey is one of the countries which is negatively affected by climate change in the Eastern Mediterranean basin. The country is under the threat of desertification and drought due to its climatic characteristics and topographic structure. In addition to the fact that 65% of Turkish soils are arid and semi-arid and sensitive to erosion, the increasing demand and pressure of growing population for natural resources are among the most important causes of desertification/land degradation.

The share of water abstraction in the agriculture sector is too high. The use of groundwater is also too high in Turkey. The National Water Plan also emphasized how to protect the quality and quantity of groundwater. The rate of drip irrigation which is more efficient than surface irrigation needs to be increased. 11th. The National Development plan also targets to increase the irrigated land until 2023 with an increase of 2 million hectares.

Major agricultural elements causing emissions in the agricultural sector are enteric fermentation, manure management and agricultural soils which account for more than 95% of the emissions.

The afforested land in Turkey increased to 22.6 million hectares in the years of 2002-2019 with a percentage of 8.7 and is planned to increase to 23.4 million hectares in 2023.

With respect to pesticide use, in the last two years, the total pesticide use decreased by 11 %. The most commonly used pesticides are fungicides, herbicides and insecticides. Total pesticide use decreased to 53,672 tonnes with a percentage of 11 % from 60,020 tonnes in 2018. Turkey is in a better position in the use of pesticides than many developed countries.

The UN has launched a dialogue process so as to achieve 17 sustainable development goals by 2030. In order to realize it, the countries are invited to prepare their own national pathways under sustainable food system and make a considerable commitment for five action tracks;

Action Track 1 : Ensure Access to Safe and Nutritious Food for All

Action Track 2 : Shift to Sustainable Consumption Pattern

Action Track 3 : Boost Nature Positive Production at sufficient scale

Action Track 4 : Advance Equitable Livelihoods

Action Track 5 : Build Resilience to Vulnerabilities, Shocks & Stresses

Turkey is one of the foremost countries to initiate the process of transformation of food systems by preparing a country report on food systems in 2019. Based on the results of the 3rd Agriculture and Forestry Council, held on 18-21 November 2019, 46 main actions and their sub-actions were determined by the Ministry of Agriculture and Forestry at the beginning of 2020, and these actions are monitored quarterly until the end of 2023.

Accordingly, Turkey will undertake actions and sub-actions until the end of 2023. Some of the actions are; the establishment of a digital value chain from seed to fork, the creation and implementation of an alternative support model with contracted production, the prevention of information pollution in food and increasing food literacy, the creation of the infrastructure for food loss and waste, and the enactment of a water law and established a monitoring and evaluation system for their implementation. Turkey will convene the next Agriculture Council in 2024.

As indicated in the National Rural Development Strategy of Turkey covering 2021-23, small-sized enterprises will be developed, agricultural productivity will be increased, quality of life will be improved and human and social capital will be strengthened in rural areas. The level of integration of these regions with the national market and other areas will be raised and the quality of and the accessibility to education, health including improving the level of nutrition in food, communication and local government services will be improved. The rural workforce, especially women and young people, who have left their job in the agricultural sector but continue to reside in rural areas, will be directed to agricultural or non-agricultural production activities, by cooperating with other ministries, relevant institutions and organizations.

This national pathway document is presented to show Turkey's preparation and dedication for transformation of food systems in achieving the 2030 agenda. The national pathway aims to reflect the current food systems, to explore how food systems function, to what purpose they serve, to analyse if the food systems enable people particularly disadvantaged people. Which urgent actions need to be taken in the coming three years are also covered. How stakeholders can work for collective actions, the connection with the pathway and the other planning documents and the key milestones are also analysed to strengthen the implementation period.

The National Pathway will start with a summary of UN food systems, the second part will give a detailed current situation in Turkey. Action tracks and their connections with SDGs will be given in the third and fourth part. Urgent challenges and needs for the food systems are given in the fifth part. Strategy and actions of the food systems will be given in the sixth part. Seventh part covers the participatory approach. Reinforcing the pathway with other planning documents will be given in the eighth part. Ninth part will consist of key milestones and future

trends. The monitoring and evaluation will be the last main topic. The pathway will end with a short conclusion.

The Purpose of National Pathway

The United Nations (UN) will convene a Food Systems Summit in New York on September 23 in 2021 to strengthen the 2030 Agenda and Sustainable Development Goals. The purpose of the Summit is to: i) ensure access to safe and nutritious food, ii) increase sustainable consumption and production, and iii) build resilience against food security gaps.

The purpose of the National Pathway is to create sustainable, resilient and equitable food systems with concrete actions in order to make a significant contribution to the realization of the vision of the 2030 Agenda for Sustainable Development.

Methodology and Works Done

The methodology for derivation of the National Pathway includes various participatory approaches including stakeholder meetings, surveys, workshops in different regional levels as well as analyses conducted on national strategy and policy studies and literature review. The strategies and actions in the pathway are mainly based on the food system country report, two online surveys and the national workshop. The first online survey was carried out with participants who are members of Business Council for Sustainable Development Turkey including a workshop with 5 members. The second survey was conducted mainly with the members of the Agriculture Forestry Council. A workshop covering a small group and a national workshop covering a larger group were organized to assess the results of surveys and gather comments and innovative suggestions regarding transformation of the food systems. It has been adopted as a principle that the entire dialogue process should be carried out with a participatory approach and be inclusive. All actors such as universities, NGOs and professional chambers are included as stakeholders and during the whole process, gender equality and disadvantaged groups were particularly considered.

Agriculture Forestry Council was created in order to develop, implement and disseminate new technologies in Turkish agriculture, forestry and animal husbandry, to determine the existing problems encountered and to find solutions, and to take decisions that will help in the formation of strategies for agricultural development until 2024. The 3rd Agriculture Forestry Council was held from November 18-21, 2019 with a significant number of representatives from universities, non-governmental organizations, private sector, farmers, and experts from the Ministry of Agriculture and Forestry and other public institutions/organizations. Within the scope of the 3rd Agriculture Forest Council, 21 thematic working groups were formed with a total of more than 1300 participants and more than 20,000 ideas for the future of Turkish agriculture and forestry¹. The targets determined on the basis of the Commission were declared publicly. Based on the results of the 3rd Agriculture Forestry Council, 46 main actions and their sub-actions were determined by the Ministry of Agriculture and Forestry at the beginning

¹ <http://www.tarimormansurasi.gov.tr/>

of 2020, and they are monitored quarterly until the end of 2023 and the results of the implementation are announced to the public. In this context, one of the most important inputs within the scope of the preparations for the Summit carried out at the national level is the outputs of the 3rd Agricultural Forest Council.

Regarding the first online survey, the questions covering the five-main action-tracks were sent to the members of Sustainable Development Association and selected firms according to the size and export potential of the firms through email. The online survey aimed to identify the problematic and intervention areas with the business leaders working actively in the food system of Turkey and the problematic-intervention areas, solution suggestions and actions were identified. 6 feedbacks were received for online questions. Also a workshop was organized with members of Sustainable Development Association of Turkey in order to discuss how the transformation of food systems is achieved in Turkey.

With respect to the second comprehensive online survey, a detailed questionnaire form was prepared and shared with members of 3rd. Agriculture Forestry Council. The questionnaire form reached 1300 experts from private and public sector to NGOs and Universities. 258 out of 1300 people replied back positively and the forms were completed perfectly. A large part of the questionnaire form consisted of open-ended questions. The analysis of results of both surveys were thus made through encoding method and accordingly, the main challenges and actions were identified.

Additionally, a workshop was also organized with over 30 experts representing different general directorates in the Ministry of Agriculture and Forestry and relevant ministries with the aim of discussing the current actions derived from online surveys. All actions were reviewed and responsible and relevant institutions for each action were determined through this workshop. Also, new action suggestions were received from participants under each action track. A national workshop was organized by focusing a gap analysis from the previous studies. Approximately 135 people out of 185 registered attended the national workshop. The workshop was organized online. After awareness raising opening speeches, participants were broken out into 5 discussion groups on the basis of 5 action tracks to discuss a thematic topic under each action track. After this national workshop, the outputs of the workshop and the previous findings were assessed and all these findings including literature review were integrated in this national pathway.



Figure 1. The Stages of National Pathway

As figure 1 states the pathway process continues. The national pathway is to be strengthened with upcoming activities including the Water Council, regional workshop and due to the dynamic nature of the process feedback from various stakeholders of the food system in Turkey will be continuously received.

To summarize, this national pathway aims to reflect the current food systems, to explore how food systems function, to what purpose they serve, to analyse if the food systems enable people particularly disadvantaged people. Which urgent actions need to be taken in the coming three years are also covered. How stakeholders can work for collective actions, the connection with the pathway and the other planning documents and the key milestones are also analysed.

1. FOOD SYSTEMS

A food system is defined by (WWF, 2018) as a system covering the activities that relate to production, processing, transport, and consumption, and grasping all the elements of environment, people, inputs, processes, infrastructure, institutions, markets and trade and consumption of food and outputs of these activities covering socio-economic and environmental outcomes. Not only does the food systems affect the human body, but they also have an important impact on the environment, economy and culture.

The last pandemic, COVID 19, clearly shows that the world food systems are quite fragile and agricultural production is negatively affected by it. When the supply chain does not work perfectly, the consumers, particularly vulnerable groups, cannot reach healthy food.

Innovation is one of the tools to improve the bottlenecks in the food systems. Food innovation can be defined as the development and commoditization of new food products, processes, and services. A weak food supply chain is one of the major challenges of the countries. So, developing new food ingredients and materials to increase nutritive value of the food and focusing on food quality through innovation and developing retailing and marketing strategies including artificial intelligence. Environmentally friendly production, improving the healthy food, preserving the natural resources and strengthening disadvantaged food system actors including small holders, women and youth are essential for transformation of food systems.

2. CURRENT SITUATION OF FOOD SYSTEMS IN TURKEY

It is estimated by FAO that the food production will have to increase by at least 50 % in order to meet demands of a growing and wealthier population with an increased meat demand. A growing population, food loss and waste, climate change, changing consumer patterns as a result of changing socio-economic conditions create a threat for food systems. In spite of the fact that the world produces sufficient food for all people, 2 billion are malnourished because of the lack of a perfect food system in the world in 2019. According to estimations for 2030, 840 million people go hungry.

Turkey has extensive resources of land and water and rare agro-ecological conditions with a total land area which is 769,630 km². Total utilized agricultural land is 37,762 of which 41.4 % consists of area of cereals and crop products. The rate of area of fruits, beverage and spice crops has increased by 36.4 % in the years of 2001-2020 while sown areas for cereals decreased to 12.8 % in the same years.

The number of animals has also increased. With the EU negotiations, Turkish agricultural policies slightly shifted to EU agricultural policies. So outward-looking trade policies are adopted in the economy. Employment and the share of agriculture in GDP still maintains its substantial importance. Agriculture accounted for 6,7 percent in GDP. and 3,3 percent of exports. Agricultural employment consisted of 16 percent of total employment in 2020. Annual average yield in most of the crops increased exponentially. The statistics also show that consumption of major commodities are met from domestic sources. According to the World Bank, the rate of urban population was 75,1 % in 2018 and is expected that it will exceed 82

percent by the year of 2050. Over 80 percent of total land fell into the 0-10 hectare group. More than 80 % of the farms are micro and small-scaled in Turkey. The less the size of agricultural holdings, the less farmers earn. Increasing productivity, diversifying the agricultural crops, improving the level of nutrition in food, improving production techniques and increasing women's role in production are among the targets of Turkish Agricultural policies. Agricultural cooperation is an important part of a sustainable agricultural system when considered by a significant number of small farmers in Turkey. Agricultural cooperatives are run as producer and irrigation unions, farmers associations and agricultural professional co-operation. However, agricultural cooperatives in Turkey needs to be strengthened in technical and institutional capacity. A tailored-made approach to improve the structure of cooperatives needs to be developed. Apart from producer cooperatives, Agricultural Credit Cooperatives of Turkey with a central union and 17 Regional Unions, 1622 Cooperatives, 197 Service Bureaus, 15 Companies, approximately 9 thousand employees, 35 billion TL total assets and 850 thousand members are the largest farmer organizations in Turkey.

Total insurance cost in state-supported agricultural insurances increased by 50.7% annually in 2020 and became TRY 83,146,049,745. Insurance rate for the poultry sector has the highest annual increase with a rate of 159.6%.

In the last two decades, there has been an increase of 7.3 tonnes in cereal production. In the same years, the amounts of increase in oily seed and tomato have been 1,7 tonnes and 4,2 tonnes, respectively. Particularly, major tomato export comes from agricultural greenhouses. Turkey has also a great potential of geothermal heat for greenhouses. It ranks 1st in Europe and 7th in the world. The amount produced in geothermal greenhouses is 4,344 decares. According to TURKSTAT, the amount of increase in greenhouse production in the last two decades has been more than 5 million tons. It is estimated that the productivity of products grown in these greenhouses is by 30 % higher. Turkey has increased its agricultural exports 4 times in recent years, with 1,690 kinds of products made to more than 190 countries. Turkey plays a vital role as one of the major exporters of hazelnut, cherry, fig, quince and apricot in the world.

According to the 2019 data of the Ministry of Agriculture and Forestry, the number of farmers engaged in organic plant production is 74,545; organic plant production area is 545,780 ha and organic plant production amount is 2,030,466 tons. In this context, since 2005, the number of farmers and production have increased approximately 6 times and the production area has increased 3 times.

With respect to animal production, there has been an increase of 300 thousand tons in red meat production, 12 million tons in milk production, 1.8 million tons in poultry meat production and 6.6 billion tons in egg production.

Turkey, with its natural conditions, agricultural structure and traditions, is a country suitable for widespread sheep and goat breeding. Ovine and goat breeding constitutes an important place in terms of animal husbandry in Turkey. Accordingly, Turkey with approximately 42.1 million head of sheep and 12.0 million head of goats (54,113,000 head in total) ranks first in Europe and is among the top 10 countries in the world.

Another sector in which Turkey is the most competitive is broiler and egg poultry. Turkey is among the top 11 countries in the world in terms of number of chickens; In Europe, it ranks 2nd in terms of production. In Turkey, approximately 1.5 million people including producers,

farmers, tradesmen related to the sector, feed, pharmaceuticals, sub-industry, transportation, marketing earns a livelihood from the poultry sector, which is one of the fastest growing and strongest sectors in Turkish agriculture.

Turkey is located at the intersection of three different biogeographical regions: Euro-Siberian, Mediterranean and Iran-Turanian and is home to approximately 12,000 species of plant diversity, one third of which is endemic. Anatolia's unique geography ensures that plants bloom in different regions at different times of the year, making Turkey a suitable ecology for beekeeping. Turkey has the largest share in world pine honey production with a ratio of up to 90%.

According to FAO statistics, Turkey ranks second after China in terms of honey production in 2019. In addition, Turkey ranks first in Europe with the number of colonies and honey production and ranks seven in the world regarding consumption of honey (daily grams per capita).

Fisheries production in Turkey was 836,524 tons in 2019, with 44.8% sea fish, 6.8% other seafood, 3.8% inland fishery products and 44.6% aquaculture products. While the production by hunting was 463,168 tons, the aquaculture production was 373,356 tons.

Turkey ranks 7th in the world in agricultural production. It is not surprising that the Turkish food and beverage industry is one of the most attractive areas for foreign investors due to its strength in this area. Since 2010, approximately USD 89.5 billion of foreign direct investment has been made in the sector, as it offers profitable investment opportunities to global investors.

Turkey also has a rich ecological diversity. The afforested land in Turkey increased to 22.6 million hectares in the years of 2002-2019 with a percentage of 8.7 and it is planned to be increased to 23.4 million hectares in 2023.

Turkey is under the threat of desertification and drought due to its climatic characteristics and topographic structure. In addition to the fact that 65% of Turkish soils are arid and semi-arid and sensitive to erosion, the increasing demand and pressure of growing population for natural resources are among the most important causes of desertification/land degradation.

According to the Entrepreneur Information System, manufacturing of food products accounted for TL 334,010,000,000 regarding net sales in 2019. According to the statistics on the basis of declarants in between 2006 and 2019, the number of workplaces increased to 51,974 from 16,230 with a percentage of 220,2. The number of paid workers increased to 463,725 from 224,293 and average incomes increased to TRY 3,393 from TRY 830.

Manufacturing of beverage products accounted for TL 17,282,612,278 regarding net sales in 2019. According to the statistics on the basis of declarants in between 2006 and 2019, the number of workplaces increased to 753 from 539 with a percentage of 39.7. The number of paid workers increased to 15,706 and average incomes increased to TRY 5,074 from TRY 1,495.

Animal production accounted for TL 27,502,055,124 regarding net sales in 2019. According to the statistics on the basis of declarants in between 2006 and 2019, the number of workplaces increased to 6,828 from 1,867 with a percentage of 265.72. The number of paid workers increased to 34,313 from 13,015 and average incomes increased to TRY 3,189 from TRY 862.

Agriculture, Forestry and Aquaculture accounted for TL 72,453,142,737 regarding net sales in 2019. According to the statistics on the basis of declarants in between 2006 and 2019, the number of workplaces increased to 16,493 from 4,957 with a percentage of 232.7. The number of paid workers increased to 95,574 from 32,812 and average incomes increased to TRY 3,148 from TRY 727 with a percentage of 333.

Aquaculture and fishery products accounted for TL 5,435,949,754 regarding net sales in 2019. According to the statistics on the basis of declarants in between 2006 and 2019, the number of workplaces increased to 1,067 from 380 with a percentage of 180.8. The number of paid workers increased to 8,192 from 2,728 and average incomes increased to TRY 3,505 from TRY 596 with a percentage of 488.

One of the major challenges of Turkish agriculture is the harvest and post-harvest losses. According to FAO statistics, losses of vegetables and fruit were estimated at 18 % and 11 %, respectively.

Population growth, rapid urbanisation and increasing per capita income has caused a faster expansion of food demand than agricultural supply, resulting in a shift in consumption patterns towards other animal products (poultry and fish) in Turkey.

As of the end of 2020, a total of 6.7 million hectares of 8.5 million hectares of economically irrigated land in Turkey have been opened to irrigation. Of this amount, 4.41 million hectares have a modern irrigation network built by DSI (State Hydraulic Works). The more the technology advances and new scientific discoveries are applied to agricultural practices, the more the efficiency of the production increases. For example, one of the most important factors for productivity increase is irrigation of agricultural land. One third of agricultural land is irrigated in Turkey. When the rest of the agricultural land reaches irrigation, this will make a significant contribution for self-sufficiency in many other products.

The Ministry of Agriculture and Forestry (MoAF) carries out important projects in implementing the technologies and decision support systems, technological agricultural applications, agricultural information systems, registration and database systems for Industry 4.0 both in its strategic plans and regulatory arrangements and in the fields of activity of the main service units.

Main applications regarding the digitalization and integration of technology in agriculture services by MoAF includes; the management of the village database with the Geographical Information System, digitization of agricultural parcels, monitoring and recording of agricultural production with satellite imaging; monitoring of air and satellite images with Integrated Administration and Control System (IACS) and Digitization of Land Parcel Identification System; creation of information systems such as Agricultural Information Systems and Agricultural System Integrated Management System, 52 Integrated Information Systems, agricultural observation stations, Agricultural Production and Registration System, Product Verification and Tracking System and National Agricultural Inventory Tracking System.

The total emission value calculated for the agriculture sector is 64.9 Mt CO₂ eq. for the year 2018 that is 15.2% of the total emission value including the LULUCF sector and 12.5% of all emissions excluding the LULUCF sector for the Republic of Turkey.

Total pesticide use decreased to 53,672 tonnes with a percentage of 11 % from 60,020 tonnes in 2018. The most commonly used pesticides are fungicides, herbicides and insecticides. Their values as tonnes are 20,600, 13,250 and 12,347 respectively. Turkey is ranked in a good place regarding agricultural pesticide use if compared with developed countries.

The 3rd Agriculture Forestry Council was held in Ankara between 18-21 November 2019 with the participation of faculty members, non-governmental organizations, private sector representatives, farmers, and experts from the Ministry of Agriculture and Forestry and other public institutions/organizations. The Council mainly aimed to implement, disseminate and develop new technologies, to determine the problems encountered in the services of agriculture and livestock sector and to find solutions with new technologies and to disseminate the know-how by using agricultural extension services in the formation of strategies for agricultural development within the scope of the 3rd Agricultural Forest Council, 21 Working Groups were formed with a total of 1300 participants in order to shed light for the future of Turkey in the field of agriculture and forestry. Based on the results of the 3rd Agriculture and Forestry Council, 46 main actions and their sub-actions were determined by the Ministry of Agriculture and Forestry at the beginning of 2020, and these actions are monitored quarterly until the end of 2023 and the results of the implementation are expected to be announced to the public. In this context, one of the most important inputs within the scope of the preparations for the Summit carried out at the national level is the outputs of the 3rd Agricultural Forest Council.

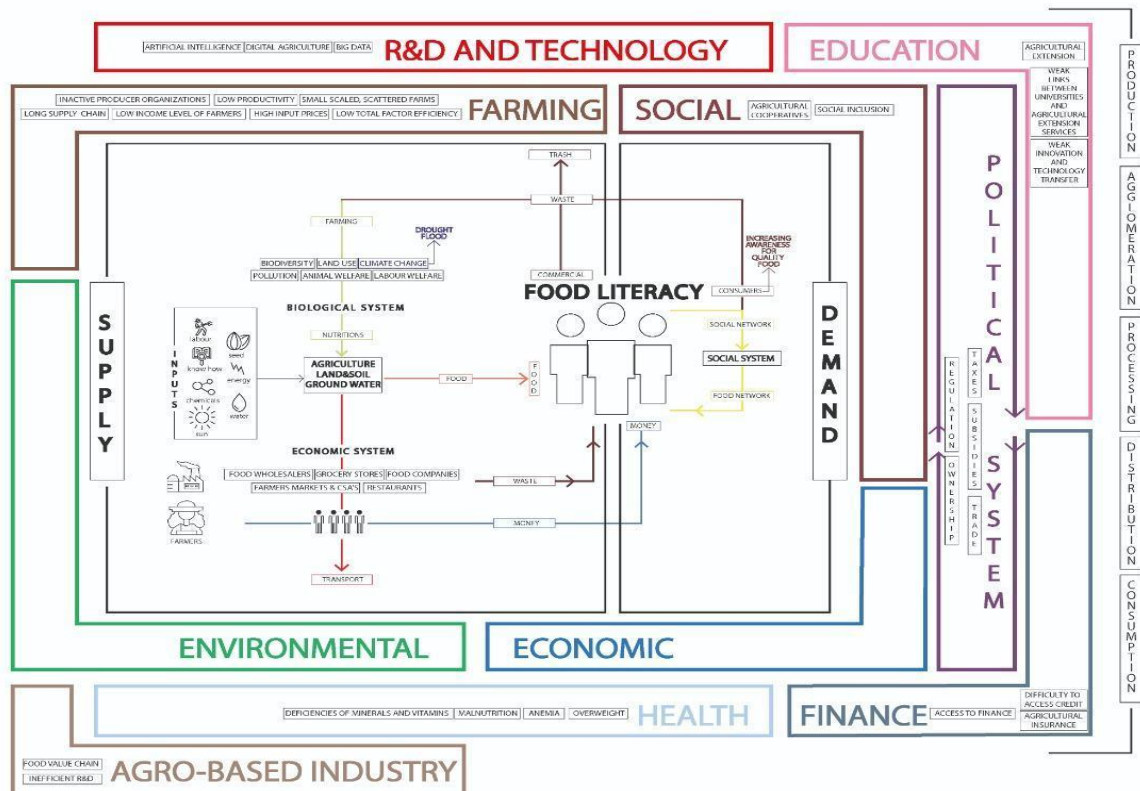


Figure 2. Food Systems in Turkey

Figure 2 shows the current food systems and challenges in Turkey. On the production side, the main problems for farmers are low productivity and marketing as well as the high prices of input such as fertilizers, oil and pesticides. The financial and digital liability are also too low. The food supply chain in between producers and consumers is long and there are a few intermediaries regulating the market. Therefore, the small-scale farmers need to sell their products much cheaper than the market prices since there are no perfect market conditions and well institutionalized agricultural cooperatives. Regarding agricultural extension, the Ministry of Agriculture and Forestry provides an extension service to farmers. But the universities need to be more involved in the extension services. The technology or innovative techniques developed at the universities or research institutes need to be transferred to farmers directly. The curricula of agricultural education need to be revised according to the latest socio-economic changes in the agriculture sector and also be more integrated with industry in line with smart agriculture. For example, Turkey is one of the countries which is negatively affected by climate change. Drought is expected to be a serious risk in the next decade. The plant varieties resilient to drought need to be extended to all Turkey through extension experts. During the harvest of the products, there is a significant amount of harvest loss since there is insufficient equipment such as storage or warehouse and also lack of awareness. After the production, there are also some losses in the post-harvest process. Some of the products are lost during the transportation to wholesaler or restaurants because of the lack of equipment while some wastes in the consumption side.

The cooperation is not so common among small holders in Turkey although some very good cooperative examples exist in the different regions. Cooperatives need to be encouraged and also technical and institutional capacity of existing cooperatives need to be improved. Cooperatives are particularly important for increasing income generation opportunities for women. Women cooperatives in rural areas can mobilize local product markets by producing healthy and local food and contribute directly to socio-economic wellbeing of rural families. Successful women-led cooperatives exist in Turkey and they need to be supported by customized policies while promoted as role models for other regions and disadvantaged women.

With respect to finance, the small holders cannot access finance. The Ministry of Agriculture supports small holders through agricultural credit cooperatives, also State Bank gives credit with zero interest. However, farmers, mainly subsistence farmers are risk averse and they are afraid of opening a business in both agriculture and non-agriculture sector. On the other side, R&D ability of the food companies is not too high in Turkey. So, traditional approaches and applications are still common in both managerial and technical sides.

Regarding the environment, awareness among small farmers for optimal use of pesticides and fertilizer is low. Excessive use of ground-water and over grazing is another problem in traditional farming practices.

With respect to technology, there is a growing number of start-ups that are interested in the agri-food sector. They develop technologies for the agriculture and food sector. This is a good opportunity for the Turkish agriculture sector. However, there is a lack of coordination among universities, public institutions and the private sector. The cooperation among these sides are quite important for a dynamic agri-food sector in Turkey.

In respect to health, a rich diet is required for a healthy population. The Turkish population does not get the recommended daily intake of minerals and vitamins. The vitamins which are lower than recommended levels are Vitamin D, B1, B2 and B6. As for the minerals which are lower than recommended levels are iron, copper, calcium and zinc. Turkey's salt consumption is almost double of the recommended level. Obesity and low physical activity in individuals aged 15 and over are also high.

3. ACTION TRACKS

The UN Secretary-General will convene a Food Systems Summit on September 23, 2021 in New York so as to maximize the co-benefits of a food systems approach across the entire 2030 Agenda. The summit aims to provide a platform for ambitious new actions including innovative solutions on food systems from countries. The objectives of the Summit are as follow;

- to raise awareness of food systems' centrality to the entire sustainable development agenda, and the urgency of transforming food systems, particularly in the wake of a global pandemic;
- to Align stakeholders around a common understanding and narrative of a food system framework as a foundation for concerted actions, making food and food systems a more widespread issue for advocacy and put some concrete actions to achieve the 2030 Agenda;
- to recognize the need for inclusivity and innovation in food systems governance;
- Motivate and empower stakeholders who support food systems transformation through the development of improved tools, measurement, and analysis; and
- to catalyse, accelerate, and enlarge bold action for the transformation of food systems by all communities, including countries, cities, companies, civil society, citizens, and food producers.

In the framework of the Food Systems Summit, 5 main action tracks have been identified. The action tracks are not separate. Each action track could address some tradeoffs with other tracks².

These action tracks are;

Action Track 1 : Ensure Access to Safe and Nutritious Food for All

Action Track 2 : Shift to Sustainable Consumption Pattern

Action Track 3 : Boost Nature Positive Production at sufficient scale

Action Track 4 : Advance Equitable Livelihoods

Action Track 5 : Build Resilience to Vulnerabilities, Shocks & Stresses

² <https://www.un.org/en/food-systems-summit/action-tracks>

Table 1. Adopted by Scientific Group for the United Nations Food Systems Summit 2021

Food System Characteristics	Social Justice Perspective	Implications for Policy and Action
<p>Action Track 1</p> <p>Ensuring Access to Safe and Nutritious Food for All</p>	<p>Unequal rights to food between developed and underdeveloped countries or among regions within a country</p> <p>Unequal rights to safe water between developed and underdeveloped countries or among regions within a country</p> <p>Unequal rights to sanitation between developed and underdeveloped countries or among regions within a country</p> <p>The rate of overweight children reside in low and middle-income countries is much more than high-income countries</p> <p>Disadvantaged groups tend to be more affected negatively</p> <p>Women tend to be affected badly</p> <p>People under temporary protection or migrants have difficulty to access nutritious food</p> <p>Technological innovations will have positive effects to mitigate the risk</p> <p>Changing dietary preferences of aging population</p>	<p>A concerted effort is needed to develop a global compact and accountability system in order to ensure safe and nutritious food for all</p> <p>Structural transformation of food systems is required</p> <p>Improved coordination, monitoring, accountability and evaluation is necessary among stakeholders</p> <p>A global monitoring and data collection opportunities are required</p> <p>Targeting undernourishment, reducing over-consumption and food waste will be essential to meet the future food demand</p> <p>Incentives need to be created on the basis of healthy, sustainable food systems and delivering safe and nutritious foods for all</p> <p>Investment in precision agriculture, digital agriculture, block chain technologies, artificial intelligence and big data will mitigate the risk for accessing to safe and nutritious food</p> <p>Investment in bio-economy is required</p>

		<p>An integrated food systems model need to be invested</p> <p>Data collecting on poverty and nutrition will be essential in order bring the three elements of safety, nutrition and inequality together</p> <p>International cooperation and coordination of food system is necessary</p>
<p>Action Track 2</p> <p>Shift to Healthy and Sustainable Consumption Patterns</p>	<p>Imperfect market conditions are more common in less developed and developing countries</p> <p>Approximately one-third of all food produced in the world is lost or wasted</p> <p>Consumption of foods high in fat, sugar, and salt has increased</p> <p>Sales of highly processed foods and sugar sweetened beverages are higher in high income countries than low-income countries</p> <p>Women of reproductive age are more affected than the other groups</p> <p>Children under the age of 5 years are affected by undernutrition</p> <p>Small and medium sized farms produce critical nutrient diversity in rural areas</p> <p>People living in urban areas have no contribution to production side of sustainable food systems</p> <p>Small scale farmers have difficulty in</p>	<p>The current food use patterns need to be transformed</p> <p>Artificial intelligence might assist in the development of demand-driven-supply chains</p> <p>Policies to foster behavioural change towards healthy diets will be needed</p> <p>Investment in providing real time information to consumers is needed</p> <p>Transition to sustainable consumption patterns requires value chain creation for creating a network among food system actors</p> <p>Investment in vertical farming will provide opportunities for increasing healthier food production in urban areas</p> <p>Accountability and shifts towards healthy diets are required through new incentives and changes in the regulatory environment</p>

	<p>exporting</p> <p>Food deserts are often associated with economically disadvantaged communities in high-income countries</p>	<p>Awareness raising trainings can modify behaviour in some cases</p> <p>Investment in food supply chain (storage, road infrastructure, food preservation capacity, etc.) are critical</p> <p>Encourage large food system actors to transition to the provision of healthy diets</p> <p>Gear public policies towards creating healthy diets from sustainable food systems</p> <p>A new relationship between public and private actors is needed</p>
<p>Action Track 3</p> <p>Boost Nature Positive Production</p>	<p>A comprehensive approach in nature positive food systems is required</p> <p>Poor people cannot access to organic products</p> <p>Nature-positive protection systems have a high initial demand for labour, particularly for women</p> <p>High-income countries import large amount of food and feed from unsustainable farming systems in low and middle income countries</p>	<p>Providing incentives for farmers and land managers to adopt nature-positive practices</p> <p>Strengthening the dialogue among academic institutions, farmer and citizen groups, industry and policy makers to translate scientific knowledge into viable action</p> <p>Shifting to regenerative conversation agriculture</p> <p>Development and use of bio-inputs such as bio-fertilisers and bio-protectants</p> <p>Rewilding natural ecosystems at the landscape level in order to restore soil health</p> <p>Rehabilitating of agricultural productivity</p> <p>Investment in research and</p>

		<p>technologies to restore land and soils</p> <p>Restoration and sustainable management of soil are critical for nature positive agriculture</p> <p>Adoption of nature-positive practices that enhance soil organic matter content</p> <p>Preparing long term strategies covering ecological, social and technological innovation</p> <p>Co-learning activities that predominantly include farmers and consumers, are crucial</p> <p>Nature-positive approaches need to be integrated into agricultural extension programs</p> <p>Investment in green technologies</p>
<p>Action Track 4</p> <p>Advance Equitable Livelihoods</p>	<p>Inequalities related to gender, youth, elderly, minority, migrant, and indigenous peoples.</p> <p>Inequality to rural/urban</p> <p>Poor people and disadvantaged groups are badly affected by conflict and crisis</p> <p>Unemployment rate is higher in women and youngs</p> <p>Small holders have difficulty to access to research and innovation</p> <p>No inclusive policies for small</p>	<p>Investment in technology, infrastructure and innovation will have important impacts on food production</p> <p>Creating a monitoring and accountability mechanism that holds governments, Businesses, and all stakeholders to account to uphold rights</p> <p>A coordinated policy agenda needs to be set up in order to make a transformational change towards healthy, sustainable, and equitable food systems</p> <p>Investment into research,</p>

	<p>holders</p> <p>Clear barriers for small holders, women, youth, indigenous people and SMEs,</p>	<p>development and deployment of innovation in order to meet the needs of small holders</p> <p>Small holders need to be involved in decision making processes</p> <p>Climate information services need to be invested since small holder can benefit from these services</p> <p>Adopt policies to eliminate barriers in access to the natural, economic and technological resources</p> <p>A cluster based industrialization providing a critical mass of infrastructure and networking opportunities needs to be set up</p> <p>Indigenous knowledge needs to be integrated with modern technological tools</p>
<p>Action Track 5</p> <p>Building Resilience to Vulnerabilities, Shocks and Stresses</p>	<p>Crisis as it seen from COVID-19 pandemic, impacts mostly the vulnerable populations</p> <p>Challenge to deliver sufficient safe and nutritious food for all in a sustainable manner in the face of a changing climate and crisis</p> <p>Lack of self-sufficient local areas and regionalized food distribution networks</p>	<p>Investment in early warning system will mitigate the risk</p> <p>Investment in irrigation systems</p> <p>Diversification of crops</p> <p>Integrating small holders more fully into regional markets</p> <p>Developing technology for postharvest reduction</p>

Source: Adopted by Scientific Group for the United Nations Food Systems Summit 2021

Among these actions, Turkey has made a significant contribution for the Action Track 2 and 5 at global level. However, a national dialog process was conducted for all five action tracks in

Turkey. At the beginning, a sustainable food systems country report was prepared by the Ministry of Agriculture and Forestry in consultation with stakeholders from public, private, universities, NGOs and the disadvantaged groups, particularly women and youth.

The Republic of Turkey, with a participatory approach, contributes to the Summit dialogues at local, national and global scales, which are held to contribute to the achievement of the United Nations (UN) 2030 Agenda and Sustainable Development Goals.

Action Track 1- Ensuring Access to Safe and Nutritious Food for All

This action track refers to three main elements in the food system. These are the right to food, the rights to safe water and sanitation and the right to be free from discrimination (Hendriks, et. al., 2020). According to WHS (2020), 21.3 of children under 5 years of age were stunted in 2019.

Diets high in fats, particularly meat and milk products, can be connected with high levels of income, whether at the national or the individual level (Drewnowski and Popkin, 1997). The more incomes grow, the more diets become more diverse and more people tend to consume red meat, milk, and fish as well as fruit and vegetables. In modern food systems, the abundance of food, especially ultra-processed food, is associated with increased risk of overweight, obesity and NCDs (HLPE, 2017).

Table 2. The components of safe and nutritious food

Component	Element	International target/s
Nutrition	Hunger	SDG2: end hunger and ensure access by all people By 2030
	Stunting (being short of age)	40 % reduction in the number of children under five years of age who are stunted by 2025 and 50% by 2030 (WHO&UNICEF, 2017)
	Overweight (children<5 years)	WHO by 2025: No increase in child overweight
	Obesity (Adults)	WHO by 2025 :halt the rise in levels
	Low birthweight	WHO by 2025/2030: A 30 percent reduction in low birth weight
	Anemia (iron deficiency)	WHO by 2025/2030: A 50 percent reduction of anemia (iron deficiency) in women of reproductive age
Food Safety	Foodborne Disease Burden	WHO Foodborne Diseases caused 600 million illnesses 420,000 deaths, and 33 million Disability Adjusted Life Years in 2010

Inequality	Inequality	SGD1: By 2030 eradicate extreme poverty for all people everywhere Access to affordable and healthy diets (SOFI 2020 says 3 million cannot afford healthy diets)
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Source: Hendriks et al. (2020).

Fluctuations in food prices, increasing population and demand for food, changing consumption habits, conflicts and economic fluctuations around the world, increases in agricultural input prices, climate change and its effects on agricultural production, limited natural resources, agricultural production and efficiency of natural resources affected by land degradation, water scarcity, rapid urbanization and abandonment of rural areas, the necessity of improving logistics infrastructure, and the recent effects of COVID-19 on food supply affect agricultural production and food security on a national and global scale. In this direction, food systems should be addressed in a sustainable way with a holistic and coordinated approach in order to solve today's problems and achieve the UN 2030 Agenda for Sustainable Development Goals. Sustainable food systems could serve as a useful tool to ensure food security and nutrition for all while securing the economic, social and environmental well-being of future generations.

It is very important that especially vulnerable groups have access to nutritious-balanced food. Many studies investigating the relationship between nutrition and health have revealed that the risk of some chronic diseases increases as a result of inadequate and unbalanced nutrition. The main health problems related to malnutrition detected in studies conducted in Turkey are protein-energy malnutrition in children, anemia, rickets, weakness and obesity seen in school-age children and youth, iodine deficiency diseases.

According to the first survey made with 6 food firms, ensuring better food security and food safety and raising awareness of the community on healthy and balanced diet are considered as priority areas under Action Track One. The respondents suggest that access to safety and healthy food need to be improved and the current regulations that do not meet food safety criteria should be strengthened and there should be a transition to sustainable food labelling. Shortening the agricultural supply chain and reducing the number of middlemen in access to food play an essential role as an action. Dissemination of sustainable agriculture principles via agricultural extension services, making necessary arrangements on contractual farming in order to establish/strengthen cooperation mechanisms within the food system could be given as urgent actions received as feedback from private food companies.

With respect to the second survey received by 258 respondents, 28.08 % of the problems indicated by respondents refers to Action Track 1. Two main intervention areas come to the front. These are sustainable food security and better public health and food safety. The measures under food security considered under this intervention area are ensuring food security and access to safe, healthy and nutritious food, healthy, balanced and adequate nutrition and waste management, disposal and reuse and recycling related to nutrition and nutritional ingredients. The other measure under this action track is public health and food safety. The measures are production of safe, healthy and nutritious food, inspections and controls, ensuring public health and food safety food safety problems.

In the national dialogue workshop on sustainable food systems, a short online survey regarding the gathering participant thoughts on urgency of action tracks among other subjects (importance of cross-cutting areas among action tracks and most affected groups from climate change) was implemented. In this survey Action Track 1 is determined as the most urgent subject by national workshop participants with 42 % of the participants' votes.

Under Action Track 1, participants identified *lack of education for conscious nutrition, low efficiency and effectiveness of production process and products, lack of awareness of the consumer for conscious and therefore healthy food consumption, inadequacy of some nutrients and obesity problem and controlling food prices and losses* as the most problematic areas. Some of the prominent action suggestions regarding those problems include; disseminating urban farming, raising awareness about correct labelling and food literacy, supporting the use of technology in increasing food fortification studies for vitamin D and iron deficiency, researching regional nutrient deficiencies, raising awareness in food preparation and consumption and preventing losses and increasing lifelong education opportunities in the society.

Action Track 2 - Shift to Healthy and Sustainable Consumption Patterns

Food systems with socio-economic changes shift rapidly. The awareness of consumers about healthy food and sustainable agriculture as well as the environment grows. This action will help to catalyse a change in consumer behaviour and will encourage sustainably produced products by aiming to shorten food supply chains by taking into account the most disadvantaged groups. As underlined by (Herrero et al., 2021) that Action Track 2 recognizes that current food usage patterns lead to a great amount of food loss and food waste and unnecessary consumption of diets including high energy in both developing and developed countries. Therefore, this track will help to protect the natural resources and people, particularly the most vulnerable.

Afshin et.al. (2019) showed that the global average intake of red meat and sugar-sweetened beverages exceeds the recommended limits suggested by experts. The high level of consumption of red meat comes from Latin America where the livestock sector has an advantage and also in high-income North America. Red meat consumption is a very fragile issue for both developed and developing countries when considering the required protein source that needs to be taken by people. Particularly, ultra processed meat is preferred by poor people living in suburban areas of developed countries. So, both developed and developing countries are negatively affected by the changing consumption patterns.

According to the 2019 data of the Ministry of Agriculture and Forestry, the number of farmers engaged in organic plant production is 74,545; organic plant production area is 545,780 ha and organic plant production amount is 2.030.466 tons. In this context, since 2005, the number of farmers and production have increased approximately 6 times and the production area has increased 3 times.

OECD/FAO, 2021 shows that average beef and veal meat consumption in Turkey in 2018-20 est. is 23 kg. The consumption levels for the same periods in Argentina and the United States

are 36 kgs and 26 kgs as shown in OECD (2021a), respectively. Regarding poultry meat, average consumption in Turkey is 21.9 kg per capita, the average consumption of poultry meat per capita in Israel, USA and Canada are 68.7, 50.9, 45.2, respectively (OECD, 2021a). With reference to wheat production, wheat production per hectare in 2019 was 2.5, the average wheat production for New Zealand and the United Kingdom in the same year was 8.8 and 8.2, respectively (OECD, 2021b).

OECD (2019) points out that daily average fruit consumption among adults over 15 year-old was 57.1 %. Australia and Spain ranked highest with percentages of 94.8 % and 84 % while the consumption of fruit in Turkey, which is 51.6 %, is lower than average 57.1 %. Daily vegetable consumption among adults in Turkey was 60.9 % in 2017, which is higher than 59.6% that is the average daily consumption of OECD in 2017.

Fish and fish products including protein and rich omega-3 fatty acids are suggested as an alternative diet when considered low levels of consumption of fish and fish products. OECD/FAO (2019) shows that food consumption in fish and seafood was 5.0 in 2016 in Turkey. The consumption percentages for Norway and Japan in the same year were 54.5 and 47.9, respectively.

In respect to consumption of honey (daily grams per capita), Turkey ranks seven with 3.3 grams while central African republics ranks the first with 9,62 grams according to FAO statistics³.

Turkey has brought the agenda of food security, food loss and waste (FLW) issues for the last decade. In Turkey, public sector, especially MoAF currently plays a pioneering role in reducing, preventing and managing FLW at the national and international level, even though some private companies, Civil Society Organizations take over an active role in reducing food loss and waste including food banking activities at the local and regional level in Turkey. In this context, ‘Technical Platform on the Measurement and Reduction of Food Loss and Waste’, as a concrete output of Turkey’s G20 Presidency, was established in the FAO Headquarters by FAO and IFPRI in 2015 with great efforts of the Ministry of Agriculture and Forestry. Furthermore, the Republic of Turkey launched the Campaign for preventing Bread Waste at the national level in order to raise awareness on prevention of bread waste and prevent bread waste at the consumption stage as well as promoting healthy bread consumption in 2013. Thanks to the Campaign conducted by Turkish Grain Board of the Ministry of Agriculture and Forestry, 384 million loaves of bread were saved in 2013, corresponded to the total amount of TRY 2,5 billion. In 2014, the UN FAO considered the Campaign for Preventing Bread Waste as the most comprehensive practice carried out through a public institution and declared it as an example of good practice around the world for reducing food loss and waste. The Sub Commission of Investigation Researching and Dissemination of Food Banking Practice established within the Petition Commission of the Grand National Assembly of the Republic of Turkey prepared and published a report on this issue and identified some duties and brilliant recommendations for the relevant public bodies in 2018. However, the first and most comprehensive initiative which covers all sectors and all food products and also handles food banking practices for reducing food loss and waste by the Republic of Turkey is the Save Your Food Campaign. In May 2020, Turkey launched the Save Your Food Campaign in cooperation with FAO. The aims of the campaign are:

³ [ca4657en.pdf\(fao.org\)](#)

- to combat against food losses and waste both at national and international level,
- to raise public awareness on food losses and waste,
- to create a role model by extending good practices on food losses and waste implemented in the world, in Turkey and also other countries and
- to support the national Zero Waste Project.

To this end, the Ministry and FAO have organized a series of events with the involvement and assistance of relevant stakeholders to contribute to the planning and implementation of activities to be realized within the scope of the campaign. Turkey, in cooperation with all countries and relevant stakeholders, aims to intensify efforts at regional, national and international levels, to reduce and prevent food loss and waste. Within the campaign, 'Turkey's National Strategy Document on Prevention, Reduction and Monitoring of Food Loss and Waste and Its Action Plan' was prepared by FAO (2020). The most important objective of the National Strategy Document is to ensure that action is taken to prevent food loss and waste through the adoption of concrete solutions drawing on the advice of concerned stakeholders and local perspectives. The following points are summarized in the National Strategy Document and Action Plan;

-raising awareness of the causes of food loss and waste; promoting solutions and trainings on prevention and reduction to all actors of the food supply chain including households; measuring, monitoring and evaluating food loss and waste; building capacity among different actors in the food chain to prevent, reduce and manage food loss and waste; changing consumer behaviour; increasing efficiency along the entire food supply chain to avoid discarding safe and nutritious products.

Online survey 1 showed that food loss and waste come front under Action Track 2. The main problems addressed by respondents are food waste and unstable food prices. Some concrete actions such as raising awareness on food loss and waste and reducing household waste are defined in the survey.

In regard to survey 2, 17.69 % of respondents indicated Action Track 2 as priority areas. The most important intervention area was considered as “Encouraging Transition to Sustainable Consumption and Prevention of Food Loss and Waste”. Food loss and food waste are the measures considered by respondents. “Preventing product loss by applying cold chain practices along food supply chains, reducing food waste in food services such as restaurants and at retail level by improving inventory management and tracking systems and reducing food waste at household level by improving food literacy for all age groups” are among concrete action suggestions by survey respondents under those measures.

In regard to the national dialogue workshop, 21% of national workshop participants think that Action Track 2 is the most urgent area for Turkey's food system. Emphasized problematic areas under the action track are; lack of awareness on safe and nutritious food, incompatibility between producers and consumers in the value chain, inadequate tracking systems for food safety and information pollution regarding the area. Participants of the Action Track 2 discussion session in the national workshop suggested actions such as; *preventing information pollution on healthy and nutritious food, raising consumer awareness, developing food labeling practices, monitoring greenhouse gas emissions and water footprints in products,*

increasing biodiversity, introducing deterrent and incentive systems for the public to prevent waste, recycling food wastes to be used as pet feeds or in pharmacology, refining organic production, adopting “produce locally and consume locally” approach, bringing excess food suitable for human consumption to those in need with food banking applications for transformation of national food system.

Action Track 3- Boost Nature Positive Production

Nature-positive food systems are defined by (Hodson et.al., 2021) as a regenerative, non-depleting and non-destructive use of natural resources. This action focuses primarily on food production systems for protecting natural systems and protected areas from new conversions for food production, managing food production systems in a sustainable way and restoring and rehabilitating degraded systems for sustainable food production and ecosystems (Hodson et.al., 2021). In this action track, consumer demands for sustainable food systems are quite important. It is considered that nature positive production, good agricultural practices or organic agriculture could have yield reductions, labour demand, more transaction costs and political incoherence. Agricultural information systems play an essential role to implement agricultural practices in a sustainable way. So, the agricultural extension services, universities and research institutions as well as technology producing companies can work under the same target. Green technologies also bring some outstanding solutions under this action track. With the help of technology, the small farmers can connect with each other and the other actors regarding technical knowledge on farming practices.

In recent years, rapid urbanization and industrial pressure triggered by migration from rural to urban areas, excessive use of natural resources due to rapid population growth and expansion of agricultural areas and tourism activities, global warming and many factors cause climate change problems. Furthermore, emissions in industrial areas cause air pollution and various environmental problems. Climate change problems are closely related to the scarcity of water resources and efficient use of water drought problems. Water use in irrigation reaches 74 % in Turkey. Agricultural production and natural resources due to climate change are affected negatively in terms of reduction of production amount, yield and quality of agricultural production, reduction of fishery products, decrease in biodiversity, erosion, land and ecosystems degradation.

Conducting research and modelling studies on the short, medium- and long-term effects of climate change on food supply, on the basis of the factors that trigger climate change and establishing a drought and flood information system together with an inventory system of land and soil systems assessed as significant preparation steps to transform into a nature-positive production approach.

Regarding online survey 1, climate change, principles of sustainable agriculture, scarcity and efficient use of water resources and sustainability and optimum productivity in food production are indicated as main intervention areas under this action track. The problems presented by survey respondents are lack of environmentally friendly food production, inefficient use of water resources and high-water consumption, lack of systems that are resistant to climate change, increasing carbon emissions due to inefficiencies of energy resources use. Solution

suggestions addressed by respondents regarding those problems are; increasing the joint working platforms for the private sector, unions, cooperatives, and state agencies, expanding the scope of legal regulations, sustainable agriculture and reduction of global greenhouse emissions, access to safe water, increasing use and dissemination of techniques and technologies that use natural resources efficiently, increasing the potential of obtaining biogas and energy from organic wastes, particularly from animal production wastes, as cost-effective and technology efficient, encouraging the reduction of carbon footprint along the value chain and controlling water consumption in agricultural production and increasing production efficiency.

With respect to online survey 2, 35.3 % of the respondents showed Action Track 3 as a priority area for Turkey. Under this track, better protection and sustainable use of the environment and natural resources is considered the most important intervention area. Climate change, scarcity and efficient use of water resources and sustainable use of natural resources are the measures considered under this track.

In regard to the national workshop, Action Track 3 is seen as the second urgent action track by the participants of the national workshop with 24% rate. The issues that are mostly discussed under the Action Track 3 area were; increasing amounts of food loss and waste, lack of digitalization and use of smart agriculture techniques across the agri-food value chain, inefficient use of natural resources and lack of efficient land and production planning. Participants of the AT3 discussion session gave some significant feedback regarding the actions to be implemented for boosting nature positive production. *Dissemination of geographic information systems and smart agriculture practices, supporting farmers for digital transformation and use of smart agriculture techniques, enacting the Water Law and increasing water efficiency with the use of technology, disseminating climate-friendly agricultural practices, protecting local diversity and genetic resources, efficient use of natural resources and updating curriculums for adapting sustainable food systems in higher education* are among those solutions suggested by the participants.

Action Track 4- Advance Equitable Livelihoods

This action points out inequalities related to women, children, minority, youth and seasonal workers in agriculture, migrant and indigenous peoples. Distribution of natural resources in a more equal way by taking into account the vulnerable groups is important. The more people from low income groups or socially excluded groups have opportunities, the more the food systems work perfectly. Food prices stability will help the vulnerable groups that are negatively affected by high prices. Transforming from production pattern to consumption one brings some problems with it. Neufeld, et al. (2021) highlighted that there is a growing gap between the locality of food production and food consumption. The processes of the food chain need to be changed with the population dynamics in urban areas. Urban and rural people, particularly vulnerable groups should access sufficient and nutritious food and also they need to be protected against pandemic conditions such as COVID-19.

Online survey 1 also points out problems and solutions regarding inequalities in rural livelihoods. Regarding the action track; encouragement of young people and women for

agricultural production, dissemination trainings that allow the farmers to learn and apply more productive and new production techniques with cooperation between public and private sectors, supporting and raising awareness of all stakeholders, more associating national Farmer Registration System with contractual farming and transition to traceable system in agricultural production are proposed as solution suggestions.

In case of online survey 2, action track 4 was prioritized by 15.77% of the respondents and the main intervention area in the track was specified as “more inclusive sustainable food systems and poverty alleviation”. Improvement of living conditions in the rural areas, development of a more inclusive approach for disadvantaged people (poor farmers, women, youth etc) takes part in the agriculture and food sector and diversification of economic activities and increasing employment opportunities in rural areas are some of the main action suggestions from the respondents.

With regard to the national workshop, only 8% of the national workshop participants think that Action Track 4 is the most urgent area. Despite this low urgency rate, under the specific discussion session for the action track participants emphasized urgency and importance of the equitable livelihood requirements for disadvantaged groups like foreigners under the temporary protection. Other stressed subjects under Action Track 4 are determined as; lack of decent job opportunities for youth in rural areas, informal employment conditions for women and other agriculture workers, lack of professional knowledge in agricultural production and lack of access to finance for disadvantaged groups. Action suggestions of session 4 participants for mentioned problem areas are; *establishing a nutrition modality especially for women and children and foreigners under temporary protection status, providing practical vocational training in agricultural production to young people, women and disadvantaged groups under temporary protection status and improving their job opportunities, defining the rights of those working agriculture sector and increasing the rate of formal employment, increasing efficiency of production unions and cooperatives, dissemination of contract farming activities, supporting young farmers, increasing the access of disadvantaged groups to technology.*

Rural population which is a big part of the food system in Turkey is among the most disadvantaged groups that is affected by inequalities in the food system changes. seasonal workers whose numbers exceed 1 million are also among the vulnerable groups. In order to strengthen the rural population, the National Rural Development Strategy (2021-2023) was prepared by MoAF. The plan has 5 strategic objectives that reinforce the national pathway for Action Track 4. These are;

- Strategic Objective 1: Improving the Rural Economy and Increasing Employment Opportunities
- Strategic Objective 2: Improving the Rural Environment and Ensuring the Sustainability of Natural Resources
- Strategic Objective 3: Development of Social and Physical Infrastructure of Rural Settlements
- Strategic Objective 4: Development of Human and Social Capital of Rural Society and Poverty Reduction

· Strategic Objective 5: Development of Institutional Capacity for Local and Rural Development

Upon derivations from national dialogue process outputs and national action plans, the national pathway includes some actions for structural changes to be expected for the food systems, more inclusive policies for agri-food sector workers and the right to access and use of relevant technology for equitable deployment.

Action Track 5- Building Resilience to Vulnerabilities, Shocks and Stresses

OECD (2020) defines resilience with three capacities; the ability to respond to and cope with an adverse event in the short-term, the ability to make cumulative changes to a system in response to current or expected future situations and the ability to create a fundamentally new system. The pandemic could reflect a good example for resilience. Due to the pandemic, high food prices, loss of income can cause people with low incomes to access sufficient and healthy food. Palmer et al (2018) stated that there is an increasing disconnection between rural and urban areas. This has a negative impact on the resilience of small-scale farmers, urban farmers, processors, traders and the health of vulnerable groups. Improving city region food systems will help people, particularly vulnerable people to access affordable and nutritious food, access to farmer markets, local and regional hubs to be established will help to shorten the supply chain.

With respect to online survey 1, Social, Economic and Environmental Problems due to Rural Immigration to Cities Triggered by Climate Change and Measure Against Food Crises Induced by Conflicts, Natural Disasters, Climate Change, Outbreaks and Pandemics were indicated as intervention areas by respondents. The problems addressed by respondents are fair access to food and social, economic and environmental problems resulting from rural immigration induced by climate change. As solutions to those problems, respondents suggested some actions such as; revising the sustainable agriculture principles legislation, supporting the economic development of farmers in sustainable agriculture areas with a view to reduce / prevent migration from rural to urban and increasing aids to alleviate the problem of hunger under the leadership of humanitarian organizations and the United Nations.

Regarding online survey 2, only 2.69 % of the respondents indicated Action Track 5 as a priority area. Increasing the resilience of sustainable food systems against food crises was defined as the main measure under the action track. Some solutions indicated by respondents are; taking more active role in the relevant studies of the international organizations, establishment of global and national food systems, building up the capacity of national and global planning and stocking capacity, development of standards and strengthening cooperation between the countries, improvement of insurance system supported by State Agencies and of necessary infrastructure (building up meteorological aspects, early warning systems and registration in agriculture).

With regard to the national dialogue workshop, Action Track 5 was assessed as the most urgent subject only for 5% of the national workshop participants. However, AT5 discussion session participants determined some urgent requirements and actions for increasing the resilience of food systems against climate change and national disasters. Session participants suggested;

disseminating programs to increase the resilience of small producers, supporting local food systems, increasing terracing and planting applications, increasing the use of organic input in production and using less chemicals, preparing emergency and long-term resilience management projections and plans, supporting actors in the agri-food value chain, supporting producer unions, developing agriculture extension services for producers, local food networks, supporting producer markets, effective implementation of circular economy as the urgent actions to be implemented by the relevant institutions.

In the evaluation part of the national workshop discussions, all participants were asked to specify the disadvantaged group that they think affected the most from climate change. According to the results, agricultural enterprises with 37% are thought to be the most affected group against climate change. Small holders with 32% came second. The rank was followed by immigrants (11%), children and youth (11%), women (8%) and babies under 5 years old (3%). Action Track 5 discussion session participants also emphasized the importance of action to increase resilience of small agricultural enterprises and smallholders for a sustainable food system approach. Actions such as informing and educating farmers about shocks and raising awareness by organizing research and training programs on a local basis with public-university cooperation are suggested for these specific target groups.

4. ACTIONS IN CONNECTION WITH SUSTAINABLE DEVELOPMENT GOALS

Sustainable food systems do not only contribute to reaching the “zero hunger” goal but also are important for achieving critical progress on all Sustainable Development Goals (SDGs). How food systems contribute to each SDG is explained by the UN in relation to the Food System Summit and here the relation is summarized according to the UN's mentioned approach.

Sustainable food systems contributes to achieving

- SDG 1, by creating good jobs, improving access to food, and supporting healthy communities.
- SDG2 , by rebuilding food systems to make them more sustainable, productive, and resilient, which is essential for solving long-term hunger challenges and managing acute shocks, like disease outbreaks and climate extremes.
- SDG3, by supporting adequate nutrition, which helps people of all ages to achieve good health.
- SDG4, by enabling students to have a healthy and balanced diet, which is critical to success at school.
- SDG5, by empowering and supporting women and bolstering their livelihoods around the world.

- SDG6, by ensuring the sustainable use of water resources and increasing access for those who do not have drinking water, while also reducing the amount of pollution in natural water systems.
- SDG7, via investments in sustainable food systems that maximize the use of clean and renewable sources of energy will reduce the food sector's environmental impact and improve people's access to clean and affordable energy.
- SDG8, by creating decent jobs and supporting the incomes of billions of people around the world.
- SDG9, by scaling up innovations and investing in infrastructure, sustainable food systems can deliver widespread benefits to people and the planet.
- SDG10, by reducing poverty and providing decent work and a good income.
- SDG11, by helping ensure that city dwellers everywhere have purchasing power and are adequately nourished.
- SDG12, by reducing waste and spoilage and empowering consumers to make smart choices in their food shopping.
- SDG13, by lowering emissions of critical climate-warming gases, including methane and carbon dioxide.
- SDG14, by ensuring the long-term viability of the world's fisheries, while also protecting the health of the ecosystems that host them.
- SDG15, via sustainable agriculture which can reduce deforestation and support healthy terrestrial ecosystems, while also providing critical sustenance to people around the world.
- SDG16, by reducing critical stresses facing families, communities, and nations around the globe, preparing the ground for peace and strong institutions to take hold.
- SDG17, by delivering tangible benefits to communities around the world.

Thus, actions that are suggested under each action track to transform Turkey's food systems into a sustainable and resilient structure will decrease the distance for the country to achieve the SDGs.

Table 3. Connection Between Food System Action Tracks and SDGs

Action Tracks	SDGs (on which actions have impact)
AT1: Ensure access to safe and nutritious food for all	GOAL 1: No Poverty GOAL 2: Zero Hunger GOAL 3: Good Health and Well-being

AT2: Shift to sustainable consumption patterns	GOAL 3: Good Health and Well-being GOAL 11: Sustainable Cities and Communities GOAL 12: Responsible Consumption and Production
AT3: Boost nature-positive production	GOAL 6: Clean Water and Sanitation GOAL 7: Affordable and Clean Energy GOAL 9: Industry, Innovation and Infrastructure GOAL 11: Sustainable Cities and Communities GOAL 13: Climate Action GOAL 14: Life Below Water GOAL 15: Life on Land
AT4: Advance equitable livelihoods	GOAL 1: No Poverty GOAL 4: Quality Education GOAL 5: Gender Equality GOAL 8: Decent Work and Economic Growth GOAL 10: Reduced Inequality GOAL 16: Peace and Justice Strong Institutions
AT5: Build resilience to vulnerabilities, shocks and stresses vulnerabilities, shocks and stress	GOAL 2: Zero Hunger GOAL 11: Sustainable Cities and Communities GOAL 13: Climate Action GOAL 17: Partnerships to Achieve the Goal

5. URGENT CHALLENGES AND NEEDS FOR THE FOOD SYSTEM TRANSFORMATION

This section is given in three parts according to the triple challenge in making better policies for the food system indicated by OECD (2021d). The first part is to analyse food security and nutrition with essential statistics for all in Turkey. Providing livelihoods to farmers and others in the food chain and promote rural development comes in the second part and the last one is to ensure environmental sustainability -i.e. using natural resources sustainably (including protecting valuable ecosystems and biodiversity) and reducing greenhouse gas emissions, as well as meeting other societal expectations such as animal welfare.

5.1 Food Security and Nutrition

Food Security

Food security is defined by FAO (1996) as it exists “all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life.”

The figure 3 shows that Turkey is a strong country regarding proportion of population under global poverty line, sufficiency of supply, micronutrient availability, market access and agricultural financial services, food safety, protein quality and food safety net programs.

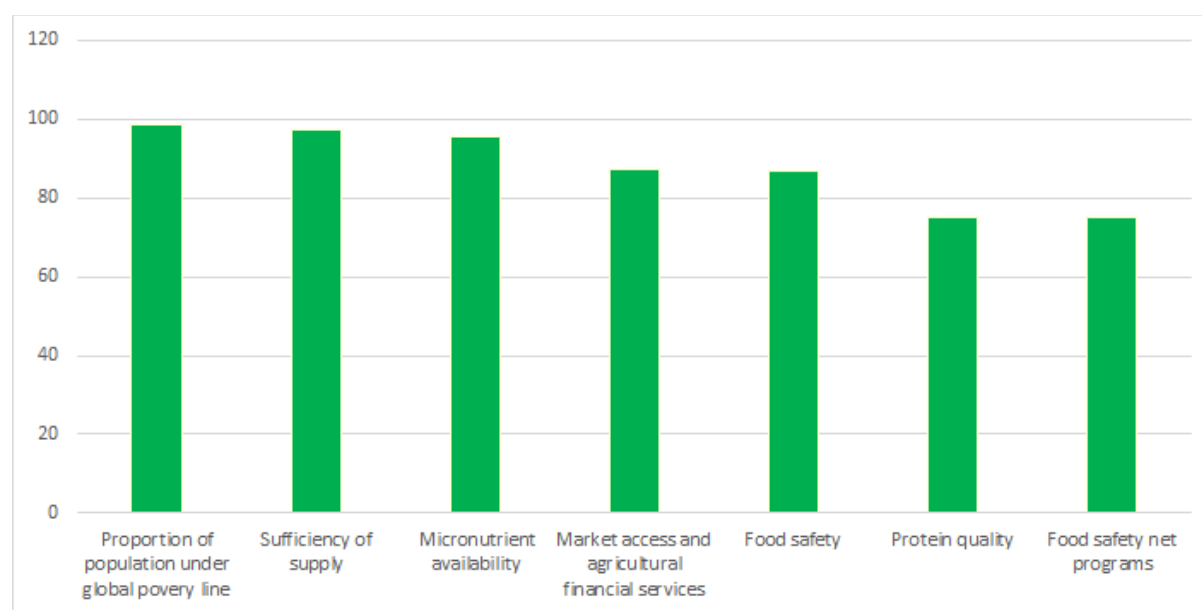


Figure 3. Figure 3. Food Security Index of Turkey *

*"Strengths" are defined as any indicator score above 75.0

Turkey's population is 83,6 million. The population⁴ is projected to be reached 92,902,462 in 2030 in Turkey. Primary agriculture accounts for 6,7 % of GDP and employs 16 % of the workforce according to TURKSTAT. This clearly shows that agriculture plays a vital role in the economy of Turkey. The country is a net exporter of a significant number of agricultural products, which account for more than 10 % of total exports. According to the Medium-Term Program (2021), added value in the agriculture sector increased by 8.7 percent in the first quarter of 2021.

According to OECD statistical databases, the GDP of Turkey increased to USD 2,347 billion in Purchasing Power Parities (PPPs) in 2019 from USD 609 in 2000. According to the inflation data of February 2021 announced by TURKSTAT, the GDP per capita was 8.599 USD, and this amount was approximately 1/3 of the agricultural population which was measured as 2.836 USD.

⁴ <https://stats.oecd.org/Index.aspx?DataSetCode=POPPROJ>

The agricultural area decreased to 37,802 thousand ha. in 2020 from 40,479 ha. in 2019. The share of Agriculture in GDP was 6.7 % in 2020 while it was 10.0 in 2000. Agriculture share in employment decreased to 16 % in 2020 from 36.0 %. Crop in total agricultural production decreased to 44 % in 2019 from 69 % in 2000. On the other hand, Livestock in total agricultural production increased to 56 % in 2019 from 31 % in 2000. Share of arable land decreased to 52 % in 2019 from 59 % in 2000.

According to FAO statistics, average protein supply in Turkey increased to 109.3 g/capita/day in the period of 2016-2018 from 103.7 g/capita/day in the period of 2000-2002. Average supply of protein of animal origin increased to 37.7 g/capita/day in 2016-2018 from 24.3 g/capita/day. The percentage of the population using at least basic drinking water services was 97% in 2020 and 99 % for the population using at least basic sanitation services. Per capita food supply variability was 32 in 2019. Regarding yield in cereals, 12.865.300 hectare was harvested and yielded 9.894 tonnes in 1961. The yield rose to 32,008 tonnes in 2019 from 10,746,739-hectare in 1961.

Regarding agricultural producers' status, there are 2,306,305 farmers according to the farmers register system and 82,6 % of the Agricultural holdings are under 100 da. in Turkey. The number of agricultural holdings over 200 da. is only 6,4 % (MAF, 2020). The figure 4 refers to the fact that more than 80 % of total farm incomes in Turkey are shared by farms which are larger than $\geq 5,000$. The smaller farmers cannot have a fair share and also the input prices are not affordable for them. This clearly shows that the livelihood is getting harder with the smaller size of farms in Turkey. According to MoAF (2020), the main challenges of small holders in Turkey are accessing finance, cooperation, risk averse, lack of leadership and difficulty to reach to market and the heavy procedures in grant programs. The small holders cannot save capital to create a viable business in both agriculture and non-agriculture sectors since they operate at low levels of resource efficiency and output.

Small holders, particularly fruit and vegetable producers, have difficulty to access the market since their products are perishable. So, cooperative marketing seems one of the most effective ways for those groups to handle marketing problems. The number of members of cooperatives is 3.5 million. Although there is a significant number of cooperative members in Turkey, Institutional and technical capacity needs to be developed. Therefore, there are still some rooms to progress for cooperative members including subsistence farmers to acquire managerial skill for quick decision to buy or sell.

Farm output in perishable products such as vegetables and fish may be produced for consumption in an area fairly close to the farm. Cooperative marketing is one of the most effective ways for subsistence farmers to deal with marketing problems.

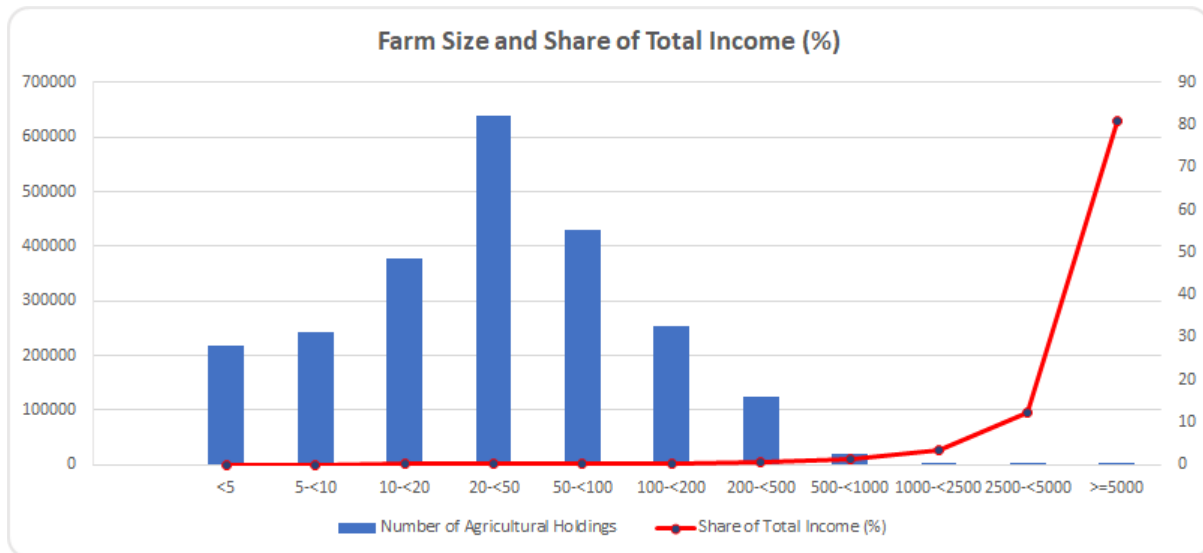


Figure 4. Farm Size and Share of Total Income in Turkey

Source: MAF, 2020a

According to the wheat projections made by OECD/FAO (2021), Turkey's wheat production is expected to increase to 23,409,000 tonnes by 2030. The growth rate of Turkey (1.40) in the years of 2021-2030 will be more than average of world wheat production (0.89) (Figure 5).

Regarding projected consumption figure 6 for wheat and food, by 2030 wheat consumption is expected to increase 25,405,000 tonnes from 23,006,000 in 2018-20 est. With respect to food kg/per capita will increase to 214,8 by 2030 with a percentage of 1.7 from 211,2 in 2018-20 est. Sugar consumption will increase to 15.6 kg per capita with a percentage of 0.14. Beef and veal consumption is projected to be increased to 36 kg per capita with a percentage of 56.5 % in the next decade. But considering the fact that current beef and veal meat consumption in Turkey is 23 kg per capita while the average beef and veal consumption in Argentina and the United States are 36 kgs and 26 kgs, respectively (OECD, 2021a). Therefore, red meat consumption needs to be increased at sufficient scale as indicated in the 11th National Development Plan.

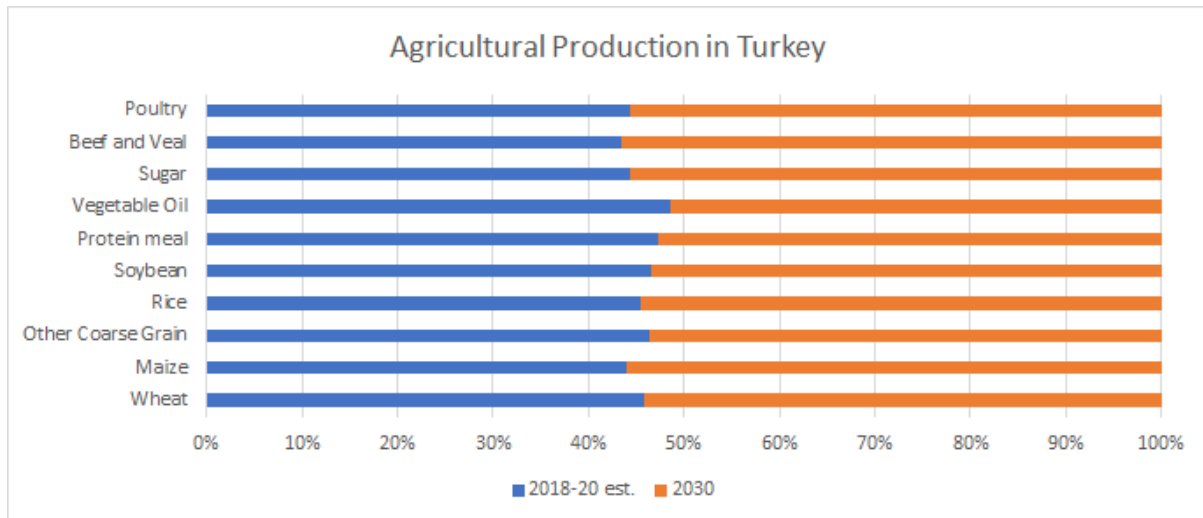


Figure 5. Agricultural Production and Projections for 2030

Source: OECD/FAO, 2021

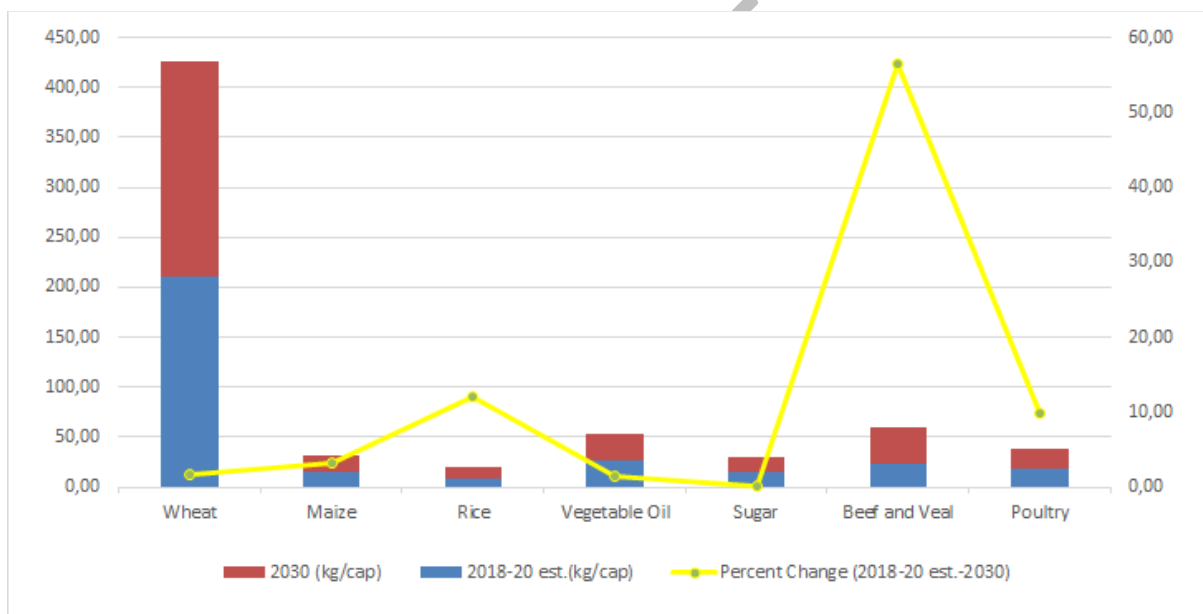


Figure 6. Consumption Projections in some Agricultural Products

Source: OECD/FAO, 2021

According to a survey made by the Ministry of Health (2019), the frequency of individuals who are worried that they will not be able to find enough food due to a lack of food is 23.4%, the frequency of those indicating that they cannot consume healthy and nutritious food was found as 22,7 %. With respect to health, the prevalence of obesity in the adult population (18 years and older) was 32,1 % in 2016. This figure was 22,2 % in 2000.

The 11th development plan of Turkey puts some targets to be achieved by 2023, which are considered important for the Food Security and Nutrition challenge. Increasing production of red meat, oilseeds, land consolidation and increasing irrigated net agricultural area, pasture reclamation and management area are some of the targets to be achieved in the plan. In terms of the meat sector, there is a production expansion for red meat and poultry meat in Turkey (Strategy and Budget, 2019).

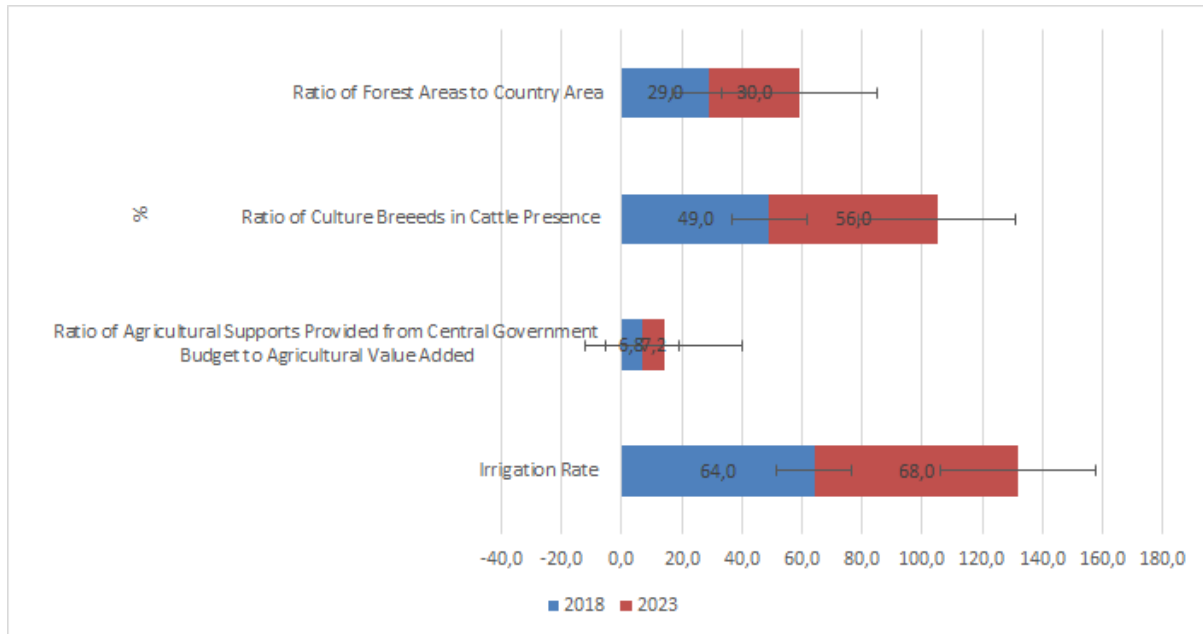


Figure 7. Targets (%) in Agriculture Sector, 11th Development Plan

Source: Strategy and Budget Department of Presidency, 2019

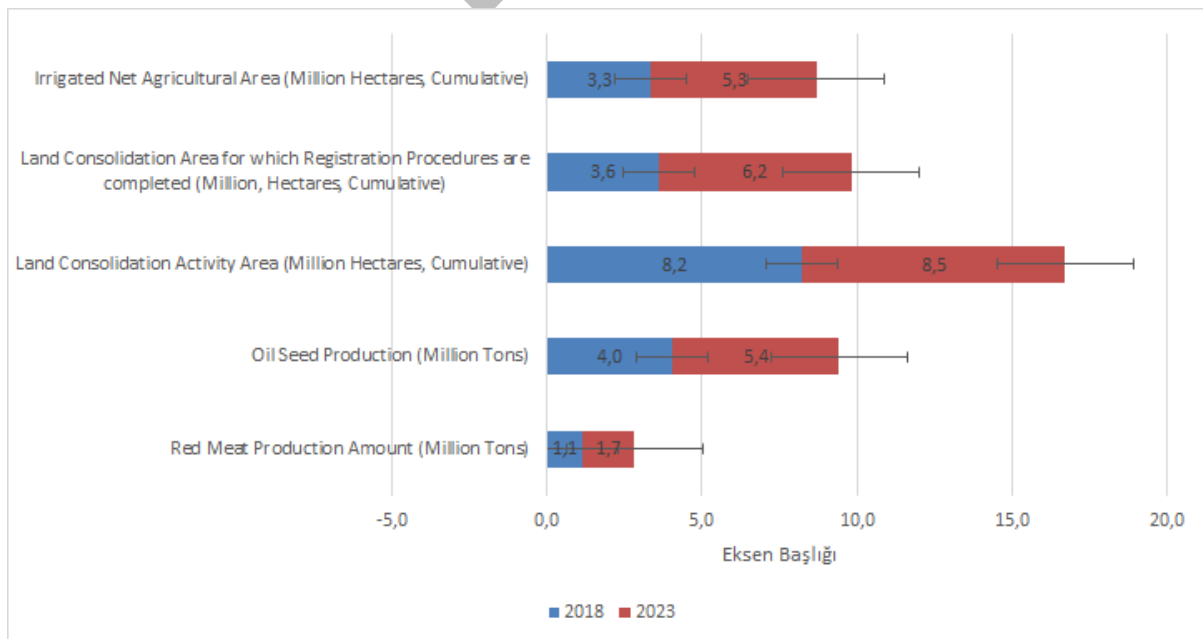


Figure 8. Targets (Million Ha. /tons) in Agriculture Sector, 11th. Development Plan

Source: Presidency of Strategy and Budget, 2019

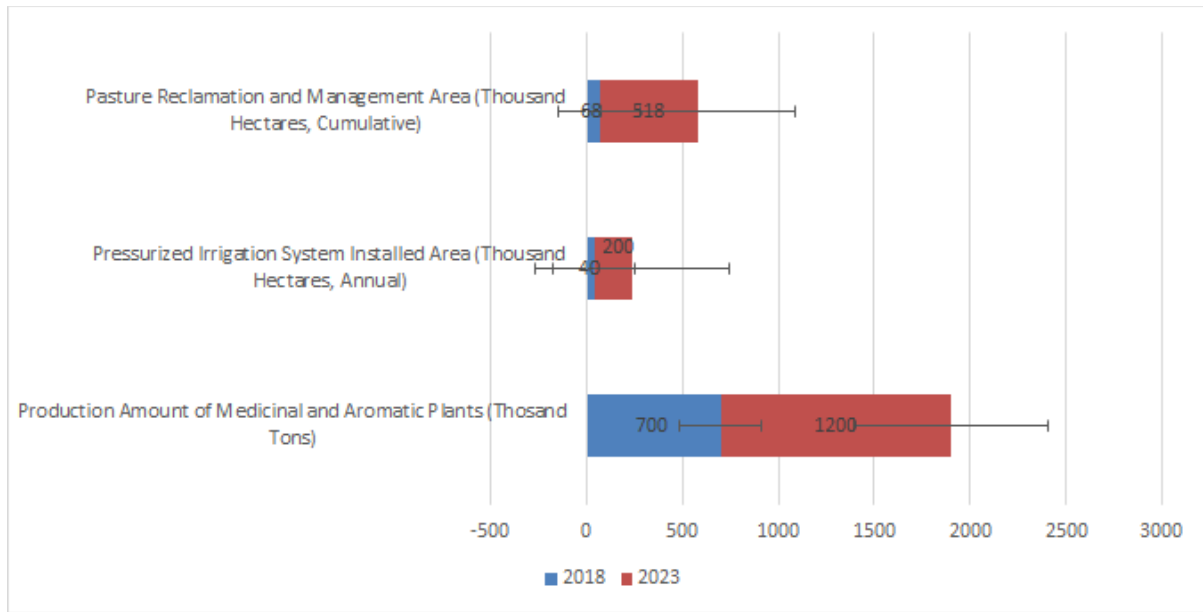


Figure 9. Targets (Thousand Ha.) in Agriculture Sector, 11th. Development Plan

Source: Presidency of Strategy and Budget, 2019

Nutrition

The basic food consumed in Turkey is bread and cereal products. Therefore, enrichment of wheat in terms of nutritional quality is of great importance. Turkey Nutrition and Health Research based on a survey made with over 24,000 people shows that men aged 15 and over consume 243.8% of the recommended daily intake of vitamin A, 149.1% of vitamin E intake, 139.4% of folate intake, and 128.2% of vitamin C intake. The intake of vitamin B6 in men for the same group is found as 91.6% and 23.7% for vitamin D. Women in the same age group consume 212.4% of daily recommended intake of vitamin A, 150% of vitamin E intake, 110.1% of folate intake, 135.0% of vitamin C intake, the intake of vitamin B6 is 83.2%, 87.7% for Vitamin B1, 82 % for the vitamin B2 and 16.9 % for vitamin D (The Ministry of Health, 2020).

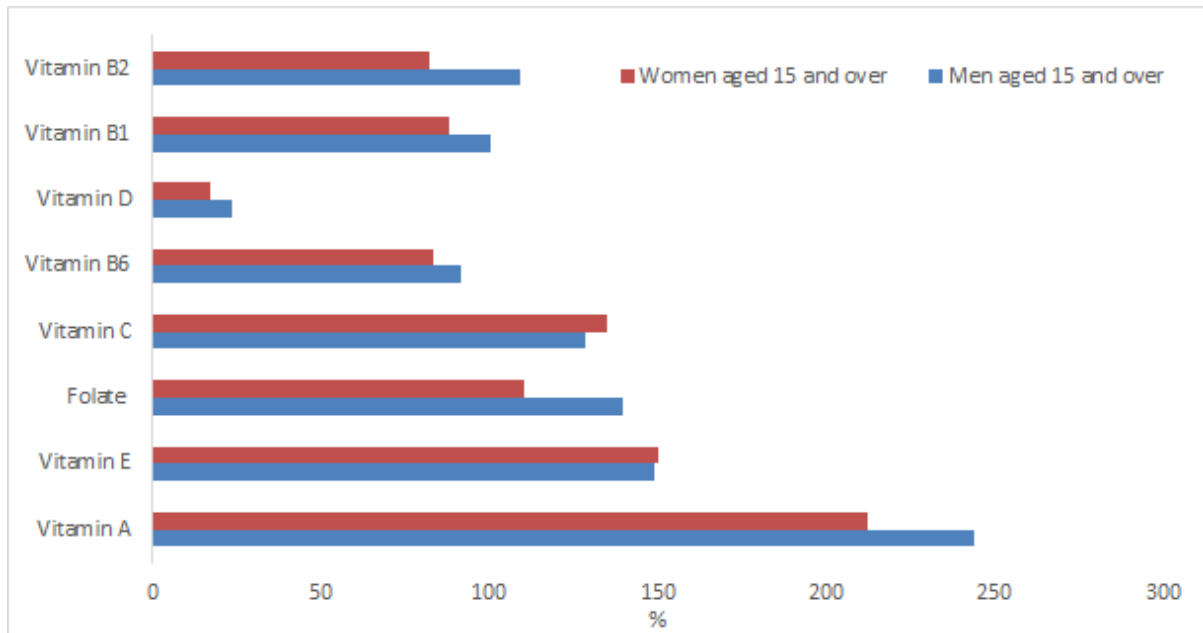


Figure 10. The Daily Recommended Intake of Vitamins (%)

Source: The Ministry of Health, 2020

Regarding minerals, men aged 15 and over participating in the study meet 93.1% of the recommended daily intake of magnesium, 89.1% of the zinc intake, and 76.4% of the potassium intake. The research points out that men aged 15 and over meet 113.52% of the daily recommended intake with calcium intakes, 107.5% in iron, 221.4% in phosphorus and 122.7% in copper intake. As for the the daily intakes of women to meet the recommended amounts are found as 167.4% for phosphorus and 113.4% for copper, 92.8% for calcium, 87.7% for magnesium, 71.5% for iron, 78.0% for zinc, 62.5% for potassium. As clearly seen in the figures iron deficiency is an important problem among women in Turkey.

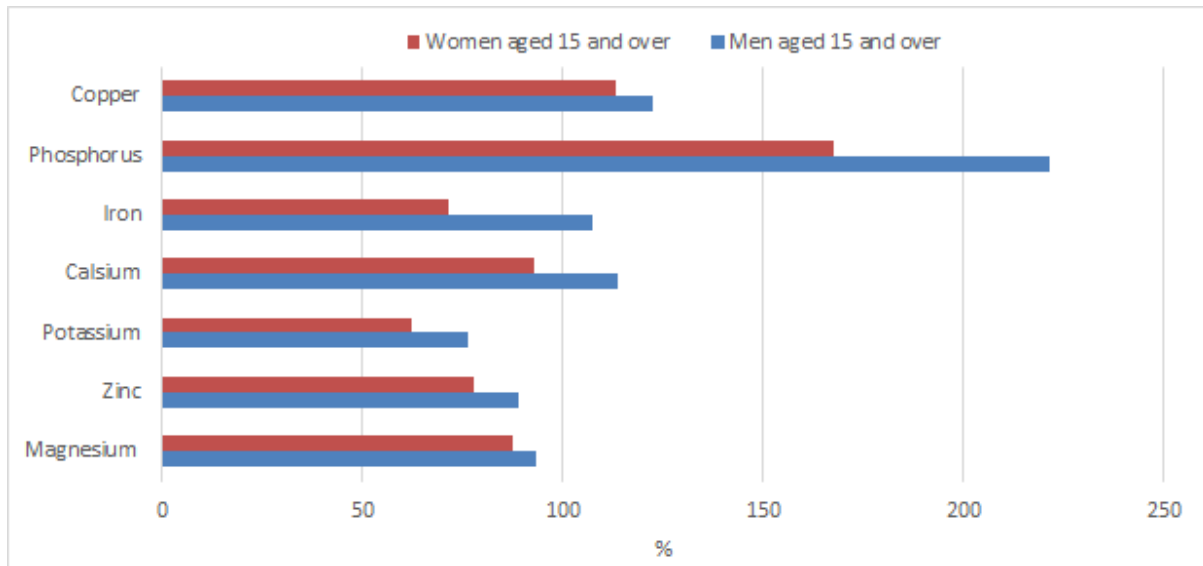


Figure 11. The Daily Recommended Intake of Minerals (%)

Source: The Ministry of Health, 2020

According to Turkey Nutrition and Health Research, obesity and low physical activity in individuals aged 15 and over were found as 31.5 % and 42.4%, respectively (The Ministry of Health, 2017). Increasing income level of population, rapid urbanization, changing diet are some of the factors of obesity. Percentage of child malnutrition increased to 1,7 % in 2018 from 1,1 % in 2014.

The prevalence of diabetes is increasing in Turkey. According to the International Diabetes Federation, Diabetes Atlas⁵ diabetes prevalence among the people ages 20 to 79 increased from 8 % in 2010 to % 11.1 in 2019. Afshin et al. (2019) stated that increased urbanisation and greater female participation in the workforce are two main factors behind the increased consumption of processed or ultra-processed food and higher amounts of sugar, salt and fats. Those tend to change their consumption pattern by eating outside the home. This poor nutrition could lead to poor health outcomes and contribute to type 2 diabetes. For the diabetes patients, patient education, medical nutrition therapy and exercise are recommended by the Ministry of Health (2014).

The National Household Health Survey conducted by the World Health Organization Country Office in Turkey in 2018 showed that salt consumption per capita in Turkey was found as 9.9 grams, which is higher than the recommended intake (5 grams) (World Health Organization, 2018).

5.2. Food Chain and Rural Development

Improving the efficiency of the food chain can help increase food supply by reducing harvest and post-harvest losses from primary production to retail stages. Losses mainly occur due to

⁵ <https://data.worldbank.org/indicator/SH.STA.DIAB.ZS?locations=OE>

the inadequate infrastructure including water and electricity, poor transportation systems, and a lack of storage facilities. Setting up a digital infrastructure can help the whole food chain to be more effective.

Harvest losses and post-harvest losses are one of major elements of food systems. Therefore, reducing the losses in harvest and post-harvest by increasing the efficiency of the food chain is quite important in order to access fair food for all. Investment to be made for transportation systems and infrastructure or installing efficient monitoring systems with the help of artificial intelligence can help to reduce food insecurity.

As indicated in the figure 12, Turkey is self-sufficient in many crops and fruit and vegetables. However, the losses in harvest and post-harvest are so high. The most important harvest losses are seen in tea with 15% and wheat with 5,1%. Regarding post-harvest losses, the products which are to a certain extent subject to post harvest losses are total vegetable balance and citrus. The percentages of loss are 12.1 and 7.4, respectively. Due to the self-sufficiency levels in Turkey, it can be said that a rich diet including red meat and fruit and vegetables need to be transferred to vulnerable groups, with low income groups, women, seasonal workers etc. FAO in collaboration with the Ministry of Agriculture and Forestry prepared a national strategy and action plan for reducing food loss and waste (FAO, 2020).

According to the Turkey Waste Report prepared by the Ministry of Trade, it is stated that 5.4% of the consumers in Turkey throw away the leftover food and 23% of the purchased food is thrown away without being consumed (The Ministry of Trade, 2018).

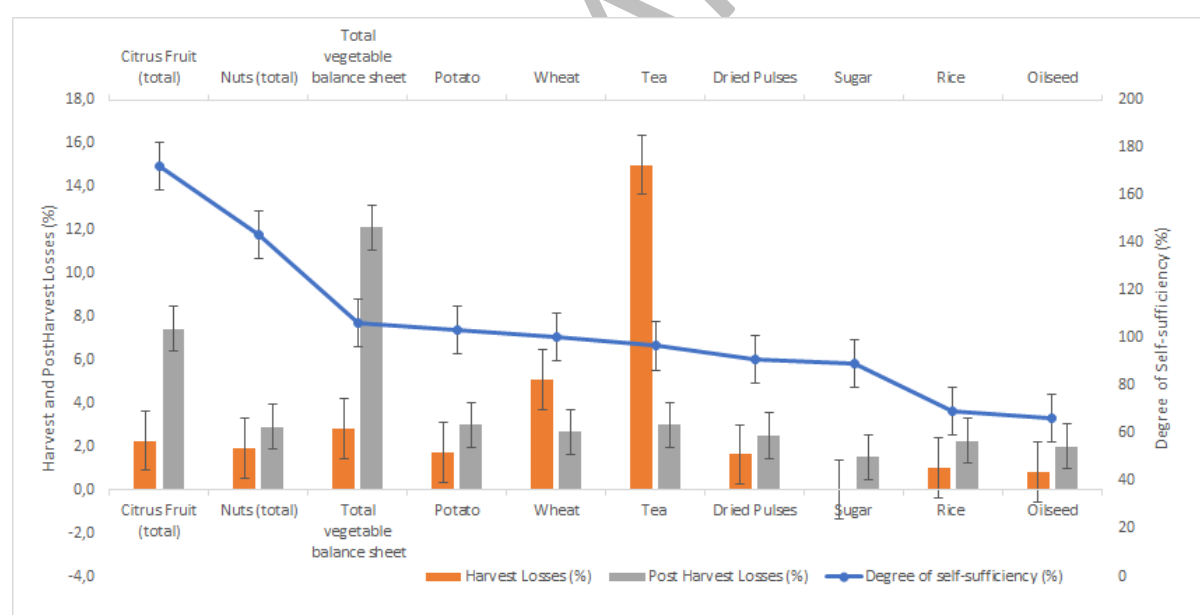


Figure 12. Crop Products Balance, 2018-19

Source: TURKSTAT, 2019

The figure 13 refers to the fact that the food, from farmers to consumers, encounters some losses in many stages. In the producer side, there is some misapplying of inputs and also traditional agricultural practices are so common.

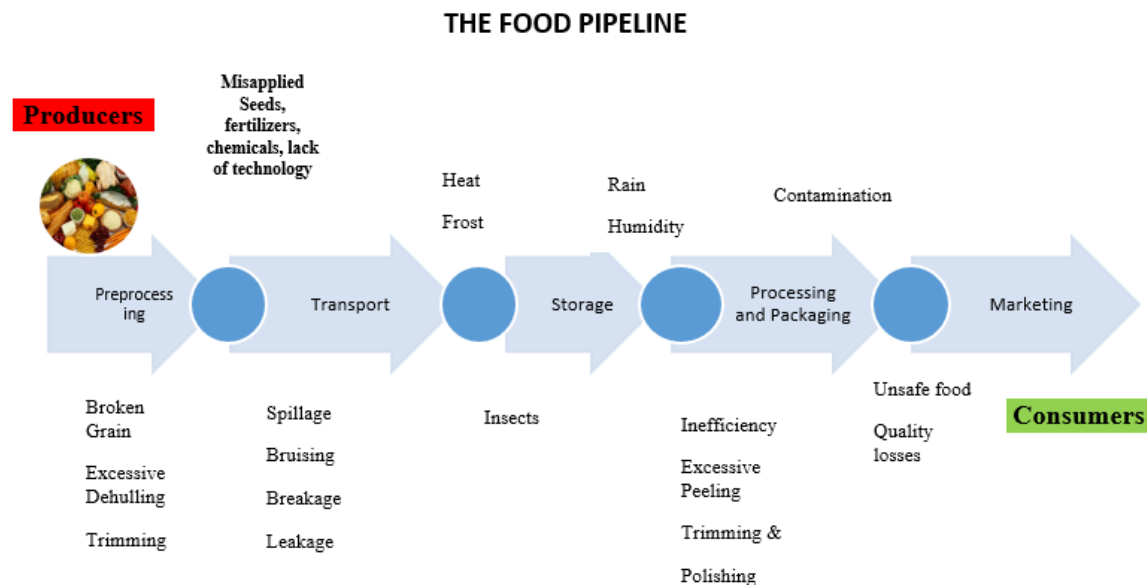


Figure 13. The food pipeline from producer to consumer

Source: National Academy of Sciences, 1985

As indicated in the National Rural Development Strategy of Turkey covering 2021-23, small-sized enterprises will be developed, agricultural productivity will be increased, quality of life will be improved and human and social capital will be strengthened in rural areas. The level of integration of these regions with the national market and other areas will be raised and the quality of and the accessibility to education, health, communication and local government services will be improved. The rural workforce, especially women and young people, who have left their job in the agricultural sector but continue to reside in rural areas, will be directed to agricultural or non-agricultural production activities, by cooperating with other ministries, relevant institutions and organizations (The Ministry of Agriculture and Forestry, 2021).

Rural poverty and lack of financial and social incentives continue to stand as one of the major reasons behind rural-urban migration causing also problems for urban development. Therefore, the generational renewal in rural areas and increase in agriculture-related employment are encouraged as the youth is crucial for the rural digitalization and promotion of innovation and R&D in the agricultural sector. In a bid to promote the adoption and use of digital technologies (DTs) in rural communities, the rural development policies emphasized the need for empowering rural youth and increasing their quality of life. It is underlined that the crucial importance of the presence of young farmers in order to achieve the sustainable development goals set by the 2030 UN SDGs and EU Post-2022 CAP priorities.

5.3.Environmental Sustainability

In Turkey, the Agricultural Land Conservation Program for Environmental Purposes⁶ has been implemented since 2006. The number of provinces where Agricultural Land Conservation Program for Environmental Purposes reached 58 provinces in 2019. The implementation area covered a total of 721,443 ha., 188,661 farmers have benefited from the program so far.

The figure 14 shows that the share of water abstraction in the agriculture sector is too high. Considering the irrigation infrastructure in agriculture in Turkey; 13% sprinkler, 7% drip irrigation method, 80% surface irrigation method is used. Irrigated land still needs to be improved. The use of ground-water in the agriculture sector is also high. The National Water Plan emphasized the protection of quality and quantity of groundwater. In the last decade a significant part of land has been open for irrigation. 11th. The National Development plan also targets to increase the irrigated land until 2023 with an increase of 2 million hectares in the years between 2018-23. A proper balance of nitrogen and potassium is essential for converting energy into new plant material. The figures can be seen in the figure below.

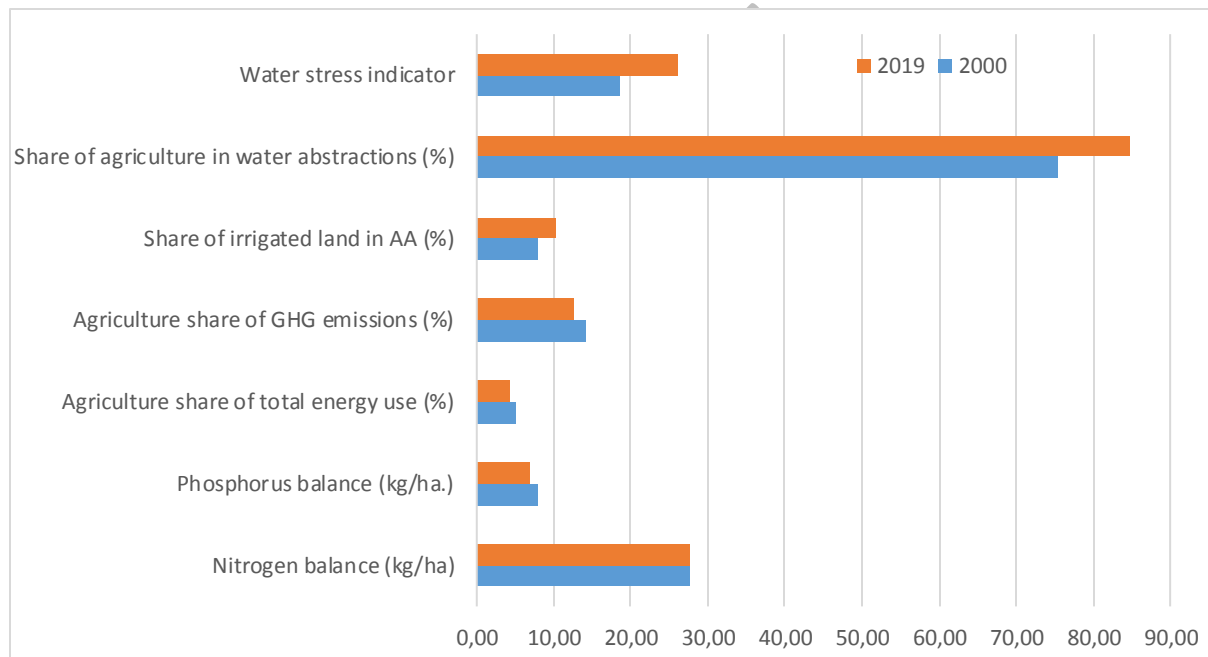


Figure 14. Environmental Indicators in Turkey

Source: OECD, 2021c

The total emission value calculated for the agriculture sector is 64.9 Mt CO₂ eq. for the year 2018 that is 15.2% of the total emission value including Land Use, Land Use Change and Forestry (LULUCF) sector and 12.5% of all emissions excluding the LULUCF sector for the Republic of Turkey (TURKSTAT, 2020).

⁶ ÇATAK (Çevre Amaçlı Tarım Arazilerini Koruma Programı) (tarimorman.gov.tr)

Figure 15 points out that pesticide use reached peak in 2018 and after that there is relatively lower use of pesticides. Total pesticide uses in 2018 was 60,020 tonnes, and decreased to 53,672 tonnes in 2020 with a percentage of 11 %. The most commonly used pesticides are fungicides, herbicides and insecticides. Their values as tonnes are 20,600, 13,250 and 12,347, respectively. During the years of 2006-2020, the use of herbicides doubled. One of the aims of extending sustainable agricultural practices is to lessen excessive use of pesticides in agricultural production.

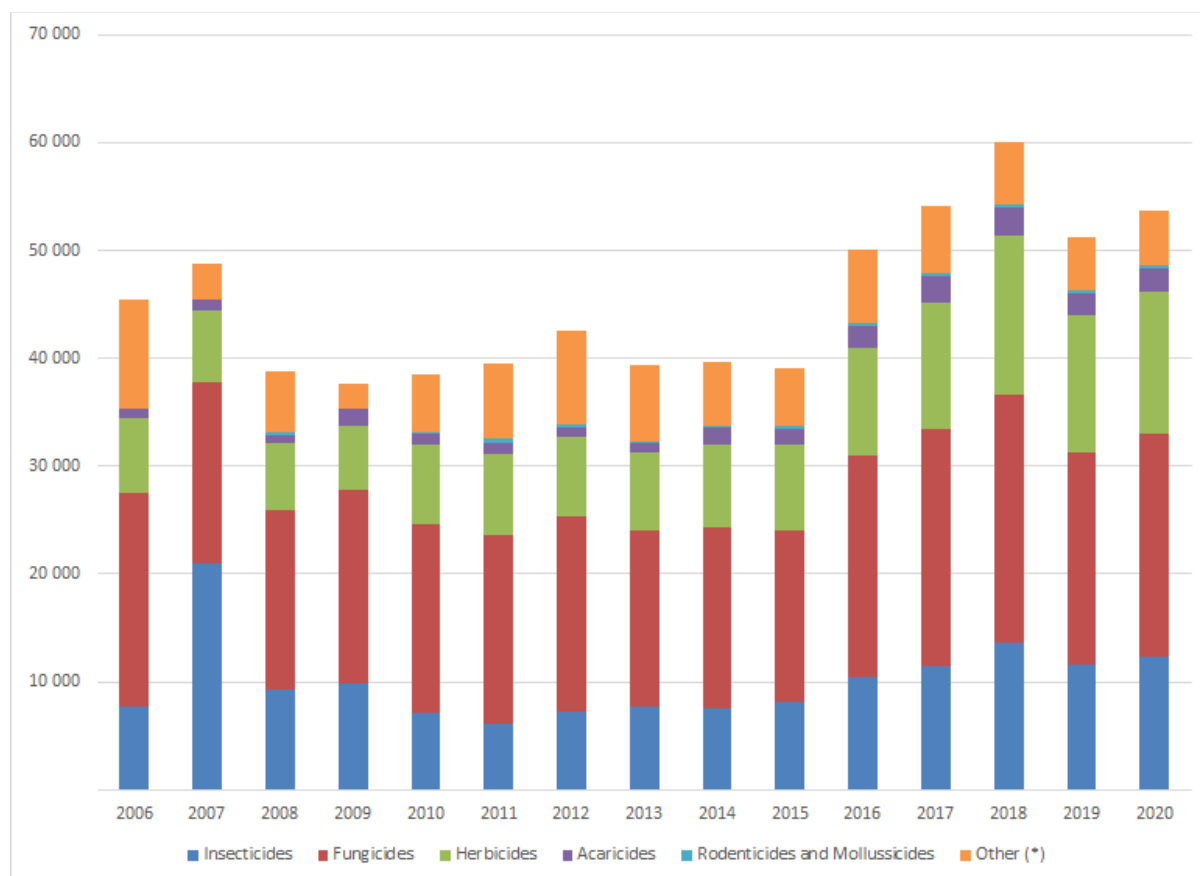


Figure 15. Pesticide Use in Turkey, 2006-2020

Source: TURKSTAT, 2021

(*) Other include plant activator, plant growth regulator, insect attractant, fumigant and nematicide.

The fertilizer use between 2005-2019 has significantly increased in Turkey as seen in Figure 16.

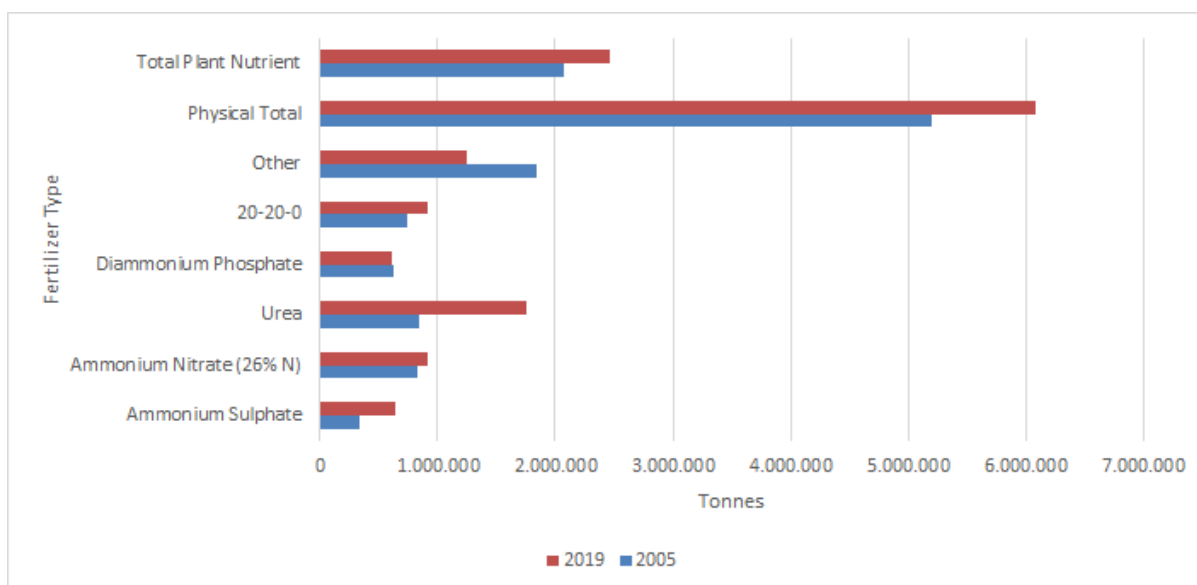


Figure 16. Fertilizer Consumption (tonnes), 2005-2019

Source: MAF, 2020b

Climate Change

Negative effects of climate change on agricultural production due to decrease in water resources, increase in temperatures, extreme meteorological events, deterioration of ecosystems, increase in erosion, decrease in biodiversity, and deterioration in soil at national scale are profoundly felt in agricultural production.

Migration from rural to urban areas, rapid urbanization and industrial pressure, rapid population growth, expansion of agricultural area and tourism activities and excessive use of natural resources pose a serious risk in terms of food safety.

The national Climate Change Strategy 2010-2023 outlines short-, medium- and long-term objectives as the basis for actions to tackle climate change, and the Strategy's goals include climate change mitigation and adaptation. The Ministry of Environment and Urbanization supervised development of the NCCAP in 2011 to enable implementation of the Climate Change Strategy.

Major agricultural elements causing emissions in the agricultural sector are enteric fermentation, manure management, and agricultural soils which account for more than 95% of the emissions as indicated in the figure 17. The biggest category in the agriculture sector in relative terms is enteric fermentation with a percentage of 49.4 for 2018.

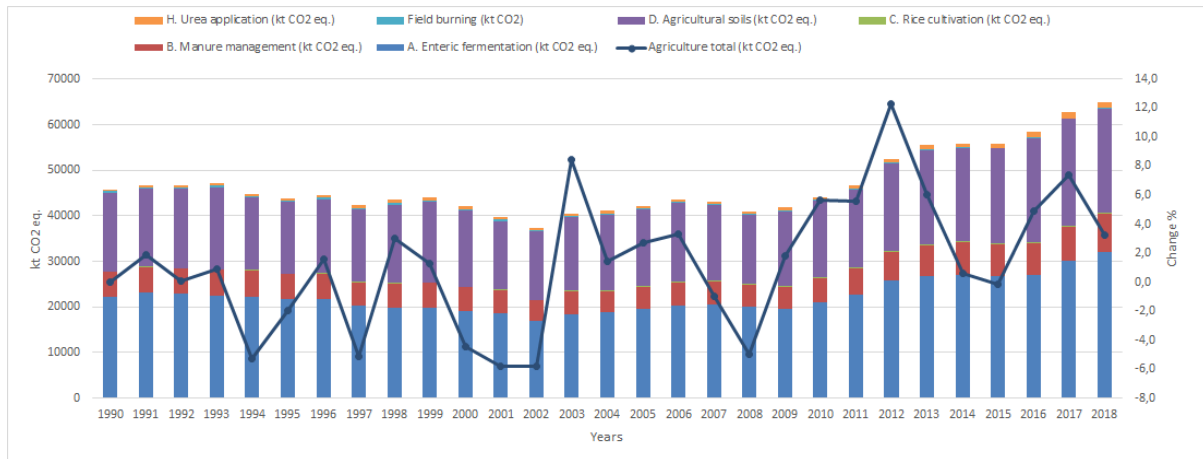


Figure 17. Overview of Agriculture Sector Emissions, 1990-2018

Source, TURKSTAT, 2021

One of the methods of reducing methane gas emissions in enteric fermentation is to use feeds more efficiently in livestock. In addition, reduction of emissions from enteric fermentation with special additives to be added to the feed and long-term management changes, improved nutritional practices such as the addition of certain oils or oil seeds, probiotics and proteins to the food and emission reduction with special nutritional additives are considered as other effective methods. Biogas production and composting in manure management, emission reduction by conducting soil analyses and continuing soil analysis support, increasing soil carbon sequestration capacity with compost applications and increasing no-till farming practices could be applied to combat climate change.

Growing population, industrial development, growing urbanization and thus rising amount of wastes put pressure on natural resources. Particularly, climate change leads to major changes in water quality and quantity. Overpopulation especially in water-scarce regions; growing rural depopulation; food security; rising socio-economic conditions; agricultural, domestic and industrial pollution, changing rainfall patterns caused by the global climate change affect all elements of the hydrological cycle. The lack and inefficient use of water has caused droughts, soil salinity and pollution, land subsidence and rural exodus.

Water management affects energy politics, the environment, public health, nature conservation and food security. For these reasons, the damage caused by climate change should be seriously addressed and water management systems should be adapted to new conditions.

Water management has traditionally been deemed in two dimensions: supply and demand management. Yet, for sustainable water management two other dimensions should be integrated as well, namely: resource management and risk management also taking elements like water quality, climate change and drought and flood management into consideration. Determining optimum plant patterns according to water resources and designing support programs considering water constraints are essential concerning climate change.

Figure 18 shows that level of floods in Turkey is more than world average, while drought is lower than world average. The risk of cyclone is too low when compared with world average.

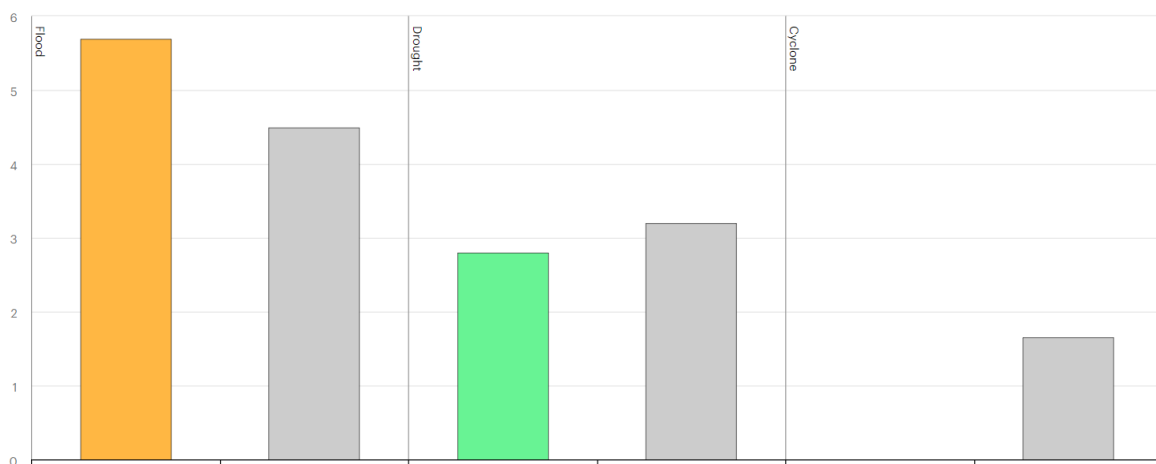


Figure 18. Level of floods, drought and tropical cyclones in Turkey, 2000-2020

Low Medium World average

Source: IEA, 2020

Level of warming in Turkey in the last two decades as shown in the figure 19, increased average 0,06 °C/year.

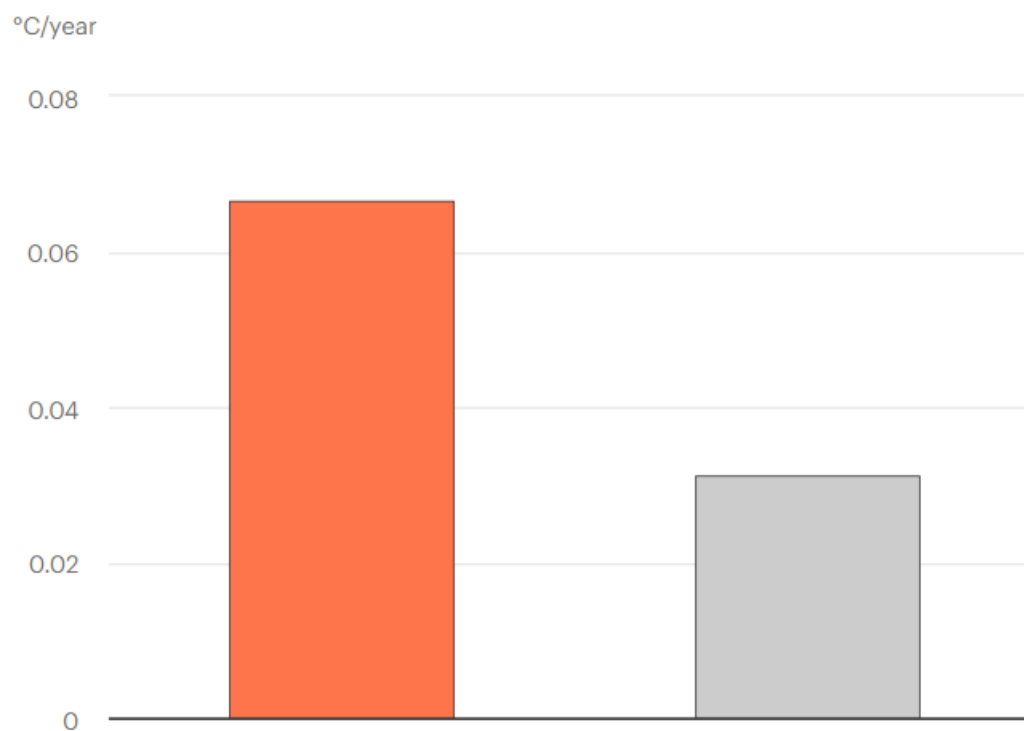


Figure 19. The level of warming in Turkey, 2000-2020

● High ● World average

Source: IEA, 2020

Figure 20 refers Turkey's mean temperature anomalies in summer. As seen clearly, the mean temperatures significantly increased year by year.

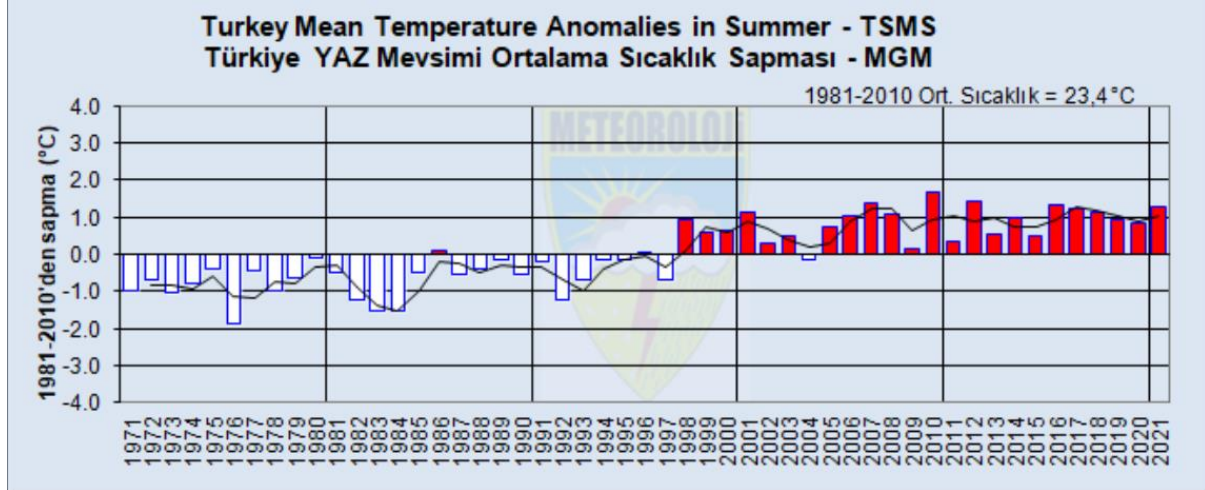


Figure 20. Turkey Mean Temperature Anomalies in Summer*⁷

Source: MOAF, 2021

The figure 21 shows the shallow groundwater levels in Turkey from January 2021. The excessive use of groundwater, particularly in agriculture sector bring serious risks for agricultural production.

⁷ [Mevsimlik Sıcaklık Analizi - Meteoroloji Genel Müdürlüğü \(mgm.gov.tr\)](https://mgm.gov.tr/mevsimlik-sicaklik-analizi)

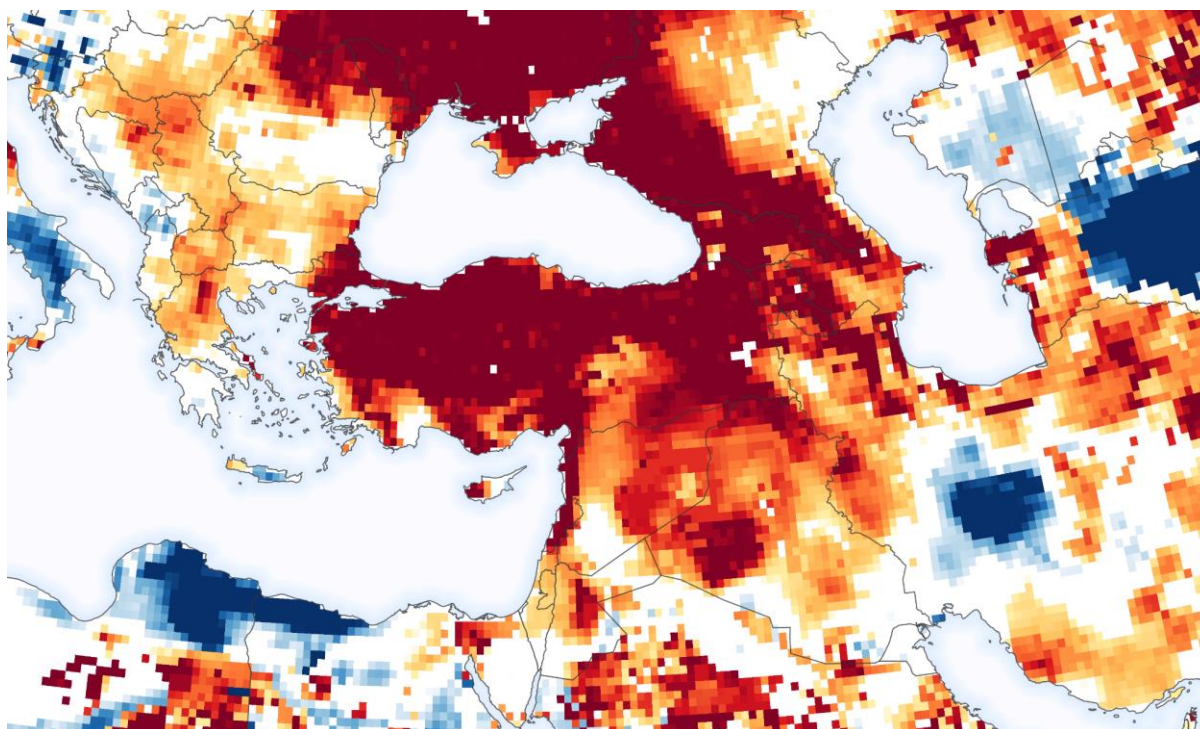


Figure 21. Groundwater Levels of Turkey



Source: [turkeydroughtgws_grc 202111_lrg.jpg](https://turkeydroughtgws.grc.202111.lrg.jpg) (3507×2110) (nasa.gov)

6. STRATEGY AND ACTIONS IN FOOD SYSTEMS

Turkey's national pathway towards sustainable food systems is drawn upon assessments of outputs of the national dialogues process along to the Global Food Summit as well as policies, strategies and actions declared nationally for improvement of elements of the food systems. Thus, an inclusive strategy-action plan could be suggested. National pathway actions are based on action tracks. In each action track strategic goals and objectives are defined according to prioritization assessments of stakeholders.

Table 4. Strategic Goals and Objectives for Action Tracks

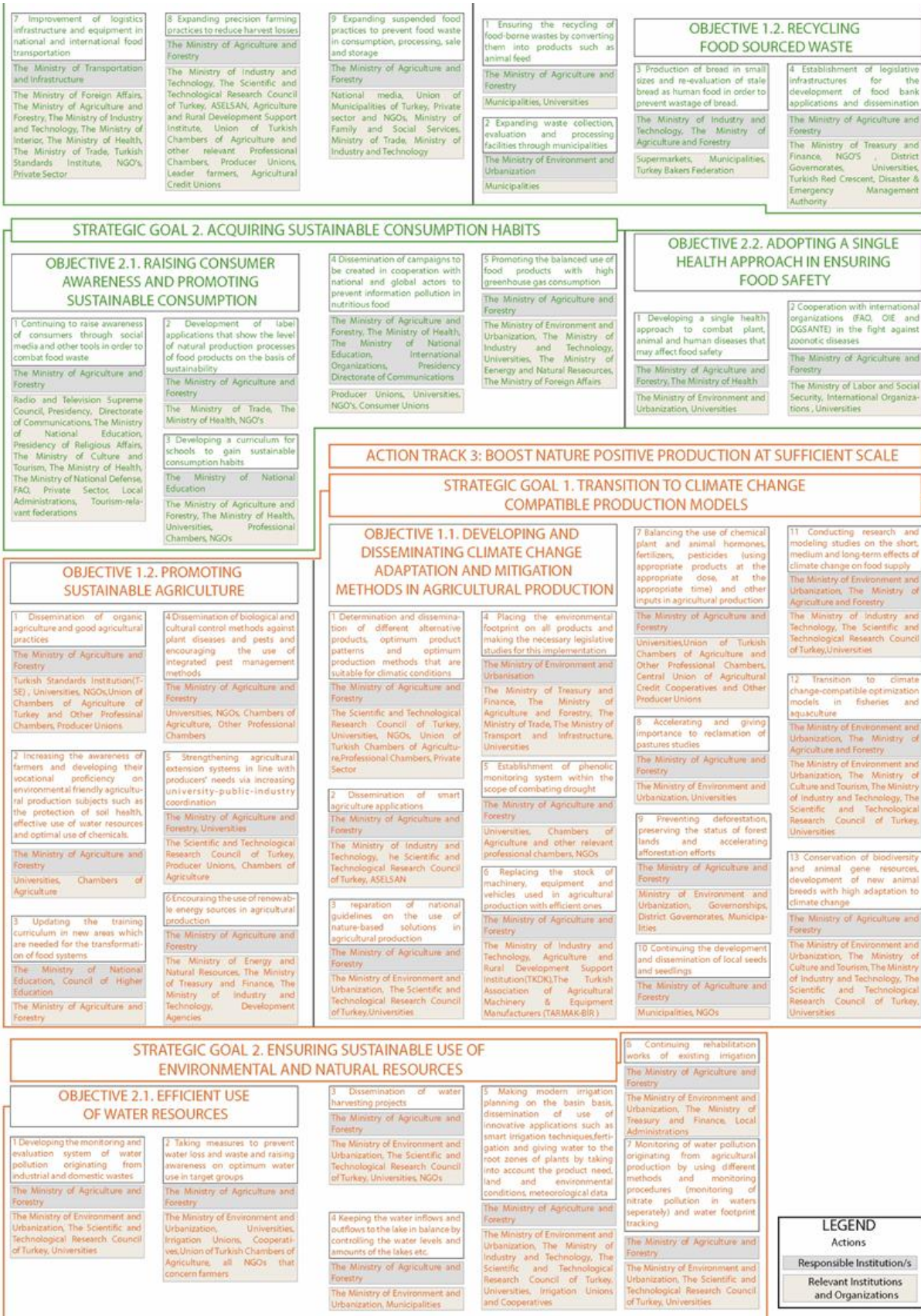
Action Track 1: Ensure Access to Safe and Nutritious Food for All	
Strategic Goal 1. Increasing Access to Safe Food	Objective 1.1. Developing Access to Safe and Nutritious Food

	Objective 1.2. Providing a Healthy and Balanced Nutrition
	Objective 1.3. Recycling Waste Consisting of Nutrition and Nutrients
Strategic Goal 2. Strengthening Public Health and Food Safety	Objective 2.1. Ensuring Reliable and Nutritious Food Production
	Objective 2.2. Improving Public Health and Food Safety Inspections and Controls with Innovative Methods
Action Track 2. Shift to Sustainable Consumption Pattern	
Strategic Goal 1. Preventing Food Loss and Waste	Objective 1.1. Reducing Harvest and Post-Harvest Product Losses and Food Losses Based on Consumption
	Objective 1.2. Recycling Food Sourced Waste
Strategic Goal 2. Acquiring Sustainable Consumption Habits	Objective 2.1. Raising Consumer Awareness and Promoting Sustainable Consumption
	Objective 2.2. Adopting a Single Health Approach in Ensuring Food Safety
Action Track 3 (AT3): Boost Nature Positive Production At Sufficient Scale	
Strategic Goal 1. Transition to Climate Change Compatible Production Models	Objective 1.1. Developing and Disseminating Climate Change Adaptation and Mitigation Methods in Agricultural Production
	Objective 1.2. Promoting Sustainable Agriculture

Strategic Goal 2. Ensuring Sustainable Use of Environmental and Natural Resources	Objective 2.1. Efficient use of Water Resources
	Objective 2.2. Sustainable Use of Natural Resources
Action Track 4 (AT4): Equitable Livelihoods	
Strategic Goal 1: Improving Livelihoods through Inclusive Sustainable Food Systems	Objective 1.1. Reducing Rural to Urban Migration
	Objective 1.2. Improving Fair Livelihoods for Disadvantaged Groups
	Objective 1.3. Strengthening the Positions of Women in the Agriculture Sector
Action Track 5 (AT5): Build Resilience To Vulnerabilities, Shocks & Stresses	
Strategic Goal 1. Increasing the Resilience of Food Systems Against Crises	Objective 1.1. Building Resilience to Food Crises Caused by Epidemics and Pandemics etc.
	Objective 1.2. Building Resilience to Climate Change and Natural Disasters

Figure 22 presents all actions under strategic goals and objectives for each action track together with responsible and relevant stakeholders.





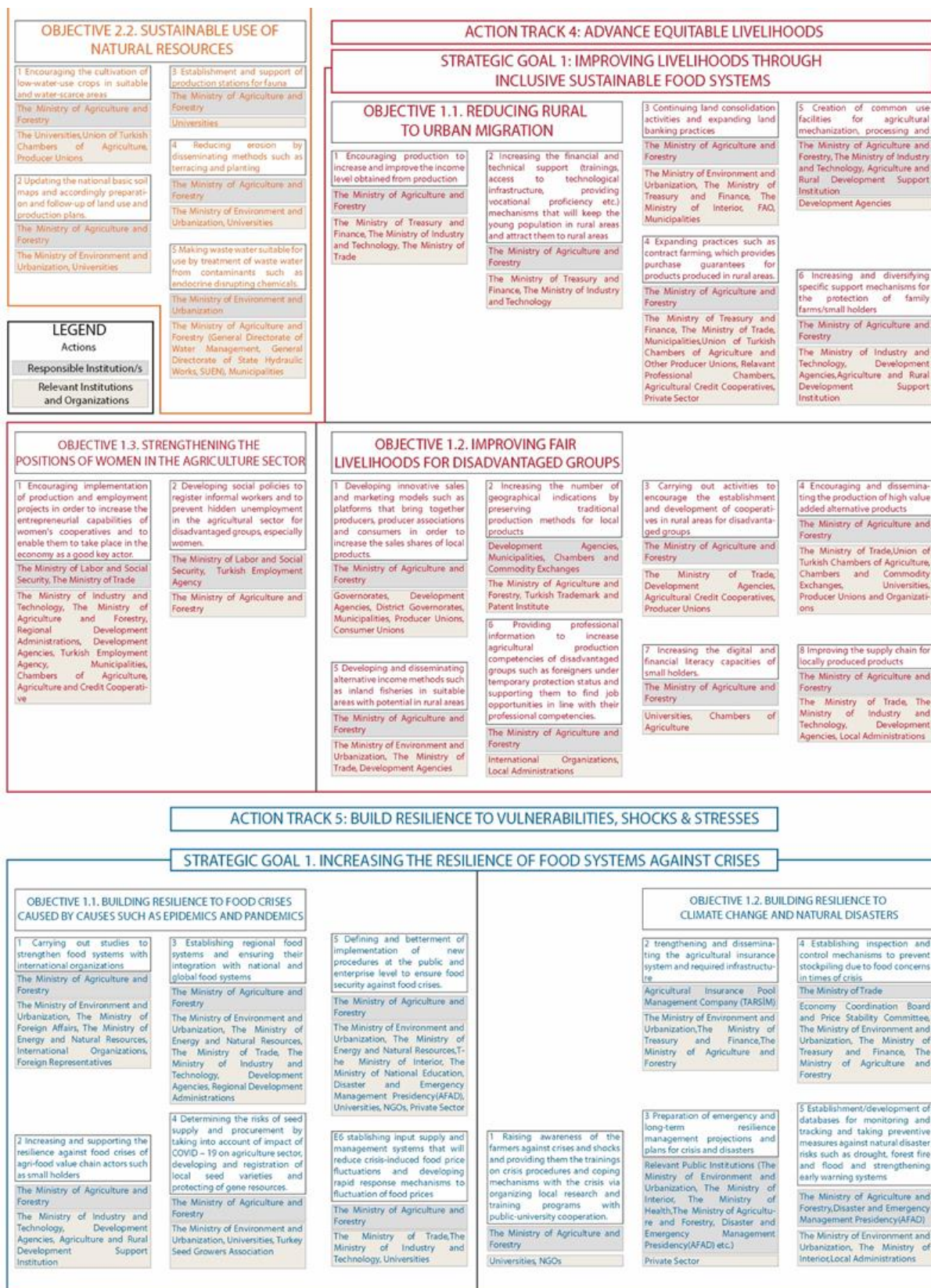


Figure 22. Strategic Goals, Objectives and Actions of National Pathway

7. PARTICIPATORY APPROACH IN THE FOOD SYSTEM

To realize changes to advance sustainable food systems, a holistic and coordinated approach is required from farm to fork through all processes of the agri-food sector value chain. Thus, involvement and commitment of diverse stakeholders including policy makers, public authorities, civil society, academics and the private sector is crucial for this transformation to occur effectively. Turkey's process to draw the national pathway has been built upon a participatory approach and fed by national plans and strategies that are committed by governmental bodies. Various participatory actions including focus group meetings, inclusive survey applications and workshops, in all of which relevant and diverse stakeholders actively contributed, are held in the National Dialogue Process. Upon outputs of these stakeholder engaged activities, national action plans and strategy documents are integrated in the process. In determining the problems-intervention areas, solution suggestions and actions for the improvement of sustainable food systems, the 3rd Agricultural Forest Council Final Declaration and the actions containing concrete commitments and the preparatory work carried out within the scope of the Summit were taken as the basis. Other national plans drawn by ministries such as MOAF, MOH, MOFSS, and MENR are also integrated in the national pathway. These plans are also results of participatory processes. Generally, groups of core expert representatives of the relevant institutions on the related subject under the coordination of the Ministry responsible for the action plan, take place in the preparation process and the draft plans are opened to the official opinions of public and private stakeholders. Thus, the national pathway and other national plans and strategies that reinforce the pathway benefitted from intense stakeholder participation and commitment.

In order to realize pathway's objectives, many different actors across the food systems need to be brought together as was the case in the preparation process. Obvious actors of the process such as policy makers, public authorities, civil society, academics and the private sector have different capacities to participate but also actors which have less chance to be heard such as women and youth are also needed to be integrated in the implementation phase in order to increase coherence and inclusiveness. These actors need to work together in a systematic way to increase the impact of the pathway actions. Responsible and related institutions for each action in the pathway are determined. These actors shall lead the implementation of relevant actions working together with wider stakeholder groups including actors affecting the action and to be affected from the action. As Turkey already takes roles in and contributes to projects and collective studies with international organizations, continuing these international collaborations and involvement of new relevant international organisations and agencies to pathway's implementation is important to increase the effectiveness and impact of the system. Upon this collective effort, the national pathway to change food systems to be better could be realized.

8. REINFORCING THE PATHWAY WITH OTHER PLANNING DOCUMENTS

National Pathway is a result of both assessments of outputs from the National Dialogue Process and measures and actions that are already determined in a national strategy or a plan that is related with food systems. Main framework of Turkey's policy, strategy, action plan, project, support documents regarding sustainable food system including national pathway is based on National Development Plans at national level in addition to international agreements, conventions and memorandums of understanding. These national plans which led to derivation and dedication to many actions for national pathways includes; the 11th Development Plan covering the period of 2019-2023, the Economic Reform Package of 2021, the New Economy Program covering the period of 2019-2021, the Strategy Document of the Ministry of Agriculture and Forestry covering the period of 2019-2023, outputs of the 3rd Agricultural Forest Council, Turkey's National Strategy Document On Prevention, Reduction And Monitoring Of Food Loss And Waste And Its Action Plan, National Energy Efficiency Action Plan (2017-2023), National Strategy Document Against Desertification (2013-2023), National Basin Management Strategy (2014-2023) , Strategy Document and Action Plan for Women's Empowerment (2018-2023), Climate Change Action Plan (2011-2023), Action Plan for Prevention and Control Of Adult And Childhood Obesity And Physical Activity (2019 – 2023), National Rural Development Strategy (2021-2023) and relevant sections of strategy documents and action plans of other relevant Ministries, Investment Programs and relevant sections of other national-scale programs, policies and documents. These plans have many actions or measures that reinforce the national pathway's objectives under each action track. This integrated structure is significant in the sense that it shows the intention of transforming into sustainable food systems from many governmental agencies.

Relation of action tracks of national pathway with main national strategies, targets, actions are summarized in figure 23.

RELATIONSHIP OF NATIONAL PATHWAY ACTION TRACKS WITH OTHER NATIONAL STRATEGY AND DOCUMENTS

AT 1: ENSURE ACCESS TO SAFE AND NUTRITIOUS FOOD FOR ALL

Eleventh Development Plan (2019-2023)	
408. Livestock farming will be developed.	411. The rules and capacities for market regulation will be improved in order to ensure food safety, efficient inventory management, reducing losses in the supply chain and preventing waste.
410. In order to ensure food safety, efficiency of inspections will be increased, the services for combating plant and animal disease and pests will be developed.	

New Economy Program (2019-2021)	
Food value chain will be reconstructed by execution of The National Unity in Agriculture Project in priority of food safety and international competition. In this context, support will be given to the studies of the Marketplace State Law.	

Action Plan for Prevention and Control Of Adult And Childhood Obesity And Physical Activity 2019 – 2023 (Action Plan Childhood Obesity)	
A. Supporting a healthy start in life	D. Ensuring that healthy options are easy options
B. Promote healthy environment in schools and pre-school	D. Ensuring that healthy options are easy options
C. Informing and strengthening of families	E. Reducing marketing pressure to children

2021 Economic Reform Package	
2.3.a The products remaining in the field and in conditions will be brought together with the buyers in the special section to be opened in the Digital Agriculture Market (DITAP).	2.3.d. In order to prevent food waste, the Food Banking System will be made attractive and expanded



3rd Agriculture Forestry Council -Main Actions by 2024	
A1: Raising welfare in rural areas, ensuring stable food supply by increasing yield and quality in agricultural production	A2: To ensure food and feed safety from production to consumption, to take necessary measures for plant and animal health and welfare
A7: Developing institutional capacity	

3rd Agriculture Forestry Council -Main Actions by 2024

1. Establishing a Digital Value Chain from Field to Fork	17. Enhancing Cooperation among Public, Private Sector and University for R&D and Innovation
4. Making legislative arrangements and put into practice for penalties to the deter of food fraudulence and adulteration	18. Promoting international projects for the exchange of experience and know-how
5. Preventing information pollution in food and increasing food literacy	32. Increasing the share of sheep and ovine meat in red meat production by increasing the number of sheep and goats

Strategic Plan of Ministry of Agriculture and Forestry (2019-2023)

A. Strengthening cooperation in the development of holistic health management and healthy nutrition	B. Establishment of healthy nutrition environments
C. Supporting the gains of lifelong healthy nutrition, especially for disadvantaged groups	D. Reorganization of health services: presentation of integrated healthcare services (providing nutrition-related information and counseling, early diagnosis, treatment rehabilitation services)

National Rural Development Strategy (2021-2023)

Priority 1.1 Improving the competitiveness of the agriculture and food sectors
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AT2 : SHIFT TO SUSTAINABLE CONSUMPTION PATTERN

National Strategy Document On Prevention, Reduction and Monitoring of Food Loss and Waste And Its Action Plan	
TARGET 1.1 Raise awareness	TARGET 1.9 Prevent and reduce food waste at household level
TARGET 1.2 Measure, monitor and evaluate food loss and waste	TARGET 2.1 Improve, enhance and monitor safe and nutritious food recovery and redistribution systems for direct human consumption
TARGET 1.3 Capacity building	TARGET 3.1 Converting former foodstuffs into animal feed, without competing with safe and nutritious food recovery and redistribution for direct human consumption
TARGET 1.4 Increase efficiency of the food supply chain	TARGET 4.2 Energy recovery from organic food waste, without competing with safe and nutritious food recovery and redistribution for direct human consumption
TARGET 1.5 Optimizing packaging and its use for all actors, including consumers	
TARGET 1.6 Enable cold chain management	
TARGET 1.7 Prevent and reduce waste in food services	
TARGET 1.8 Prevent and reduce food waste at retail level	

Action Plan for Prevention and Control Of Adult And Childhood Obesity And Physical Activity 2019 – 2023 (Action Plan Childhood Obesity)	
B. Promote healthy environment in schools and pre-school	D. Ensuring that healthy options are easy options
E. Reducing marketing pressure to children	

Action Plan for Prevention and Control Of Adult And Childhood Obesity And Physical Activity 2019 – 2023 (Action Plan For Adults)	
B. Establishment of healthy nutrition environments	

3rd Agriculture Forestry Council -Main Actions by 2024	
6. Establishing the infrastructure to prevent food loss and waste	7. Encouraging the Consumption of Capi and Ovine Animals/Meat and Increasing its Market Share
17. Enhancing Cooperation among Public, Private Sector and University for R&D and Innovation	18. Promoting international projects for the exchange of experience and know-how
28. Supporting R&D projects for the re-use of wastes in order to reach the zero waste goal	33. Increasing alternative aquaculture species, production and productivity in aquaculture and hunting activities within the framework of sustainability principles

Eleventh Development Plan (2019-2023)	
403. By providing accurate and reliable data at macro and micro level, the whole chain extending from seed to table will be fully recorded, annual monitoring and evaluation activities will be institutionalized, agricultural information systems will be completed and effective use will be ensured.	413. Cooperatives and producer unions will be actively incorporated into the system in order to reduce the number of intermediaries in the distribution chain in the marketing of agricultural products, to ensure the consumer access to the product at reasonable prices and to establish a direct connection between the producer and the consumer.
414. Mechanisms will be established to ensure that agricultural products produced at local and regional level achieve the added-value they deserve.	

Strategic Plan of Ministry of Agriculture and Forestry (2019-2023)	
A2: To ensure food and feed safety from production to consumption, to take necessary measures for plant and animal health and welfare	A7: Developing institutional capacity

2021 Economic Reform Package	
2.3.a The products remaining in the field and in conditions will be brought together with the buyers in the special section to be opened in the Digital Agriculture Market (DITAP).	2.3.d. In order to prevent food waste, the Food Banking System will be made attractive and expanded
2.3.c Support will be given to the establishment of a cold chain in order to reduce the loss of vegetables and fruits.	2.3.e. Awareness of consumers about food waste will be increased through social media and other communication tools



AT3: BOOST NATURE POSITIVE PRODUCTION AT SUFFICIENT SCALE

Eleventh Development Plan (2019-2023) <p>405. Protection, effective use and management of agricultural lands will be ensured.</p> <p>406. Investments will be prioritized and maintained in order to expand irrigated areas, and efforts towards quality and quantity wise preservation and efficient use of water will be furthered.</p> <p>407. Plant production will be increased.</p> <p>408. Livestock farming will be developed.</p> <p>409. Production and exports will be increased in the aquaculture sector.</p> <p>412. In agricultural production, biodiversity in the field of local animal breed and seeds will be preserved and made sustainable.</p> <p>415. The contribution of forests to the economy will be increased through sustainable forest management.</p> <p>416. The efficiency and quality of agricultural R&D activities will be increased by improving coordination and cooperation between public, university, private and industrial sectors in agricultural research activities.</p>	2021 Economic Reform Package <p>2.3.b. Guidance will be provided with guide documents for the production, logistics and retail sectors</p> <p>2.3.f. In order to contribute to agricultural production planning, increase predictability in production and prevent price fluctuations, contract farming mechanisms will be developed that will increase the confidence of farmers and industrialists in written contracts.</p> <p>2.3.g. The Proposal of the Market Law, which will also reduce the intermediation costs in unprocessed food prices, will be submitted to the Parliament.</p> <p>4.1.e. With the amendment to be made in the Energy Efficiency Law; buildings and energy efficiency supports in agriculture and service sectors will be included in the scope</p>	Climate Change Action Plan (2011-2023) <p>PURPOSE 1.3. Develop information infrastructure and capacity in the agriculture sector</p> <p>PURPOSE 03. Limit the negative impact of land uses and changes such as forests, pastures, agriculture and settlements on climate change</p> <p>PURPOSE 02.2. Developing and expanding R&D and scientific studies to identify the impacts of climate change on agriculture and to ensure adaptation to climate change</p> <p>PURPOSE 03.3. Sustainable planning of water utilization in agriculture</p> <p>PURPOSE 04.4. Protecting soil and agricultural biodiversity against the impacts of climate change</p> <p>PURPOSE 001. Integration of the climate change adaptation approach to ecosystem services, biodiversity and forestry policies</p> <p>PURPOSE 03.3. Develop and expand R&D and scientific studies to ensure adaptation to the impacts of climate change in water resources management</p> <p>PURPOSE 04.4. Integrated management of water resources and water basins for adaptation to climate change</p> <p>PURPOSE 01.1. Ensure Effective Waste Management</p>
3rd Agriculture Forestry Council -Main Actions by 2024 <p>1. Establishing a Digital Value Chain from Field to Fork</p> <p>2. Establishing and Implementing an Alternative Support Model with Contractual Production</p> <p>8. Establishing 7 more heifer centers under the Breeding Heifer Production Center Project; consequently, increasing the total number to 32</p> <p>9. Building mass feeding houses and establishing a mulberry garden within the scope of Silkworm Production Basin Project</p> <p>9. Building mass feeding houses and establishing a mulberry garden within the scope of Silkworm Production Basin Project</p> <p>10. Completion of Branding Infrastructure Works for Agriculture and Forestry Products</p> <p>11. Efficient use of meteorological information in every stage of production in agriculture and forestry</p> <p>13. Increasing the Production of Fiber Plants to be Used for Industrial Purposes</p> <p>14. Use of high technology and artificial intelligence applications in response to forest fires</p> <p>16. Establishing the necessary legal regulations in terms of fire safety in licensing of dwellings and workplaces in and around the forest</p> <p>17. Enhancing Cooperation among Public, Private Sector and University for R&D and Innovation</p> <p>18. Promoting international projects for the exchange of experience and know-how</p> <p>19. Evaluating all legislation on agriculture and forest with a holistic approach, establishing a simple legislative structure</p> <p>21. Enacting Water Law</p> <p>22. Establishing and disseminating alternative models such as land banking and co-production in order to bring idle agricultural lands to production and solving the problem of transfer in agricultural lands by developing inheritance legislation</p> <p>25. To conduct fight against desertification and erosion effectively and efficiently</p> <p>44. Preparation of land use plans and agricultural land use plans, completion of detailed soil surveys</p> <p>45. Completion of land consolidation projects by ten years</p> <p>27. Completing the identification and restraint studies of pastures, highlands and winter quarters</p> <p>28. Supporting R&D projects for the re-use of wastes in order to reach the zero waste goal</p> <p>29. Development of Licensed Warehousing, dissemination of electronic product trade</p> <p>30. Increasing Buffalo Number and Productivity</p> <p>31. Reaching international averages in calf mortality and fertility statistics</p> <p>33. Increasing alternative aquaculture species production and productivity in aquaculture and hunting activities within the framework of sustainability principles</p> <p>34. Development and Expansion of Domestic and National Seed and Seeding Sectors</p> <p>35. Conservation, development and commercialization of local (Ata) seed varieties</p> <p>36. Increasing production and marketing opportunities with Medicinal and Aromatic Plants Action Plan</p> <p>37. Thanks to promoting the production and use of organic and organomineral fertilizers, reducing the import of chemical fertilizers and environmental pollution, spreading the biological and biotechnical control methodologies</p> <p>38. Conservation and Breeding of Our Pet Genetic Resources</p> <p>39. Increasing studies on determination, protection, improvement and dissemination of domestic genetic resources and biodiversity in the areas of agriculture and forestry, genetic resource database project</p> <p>40. Production of Veterinary Biological Products and Pharmaceutical Active Ingredients by encouraging technology and R&D investments</p> <p>41. Completing the national forest inventory</p> <p>42. Making our country an international forest sapling production and marketing center</p> <p>43. Eliminating the ownership problems experienced in the allocation and determination of the places to be moved beyond the forest boundary, by completing the registration of the forests whose cadastre has been finalized</p> <p>48. Uncovering our nature tourism potential and becoming an international brand in nature tourism</p> <p>46. Prioritization of new irrigation investments and rehabilitation projects</p>	New Economy Program (2019-2021) <p>An early warning system that allows a healthy supply and yield forecasts for agricultural products will be established.</p> <p>Necessary institutional and legal infrastructure will be established in order to bring the idle agricultural lands into agricultural production.</p>	Strategic Plan of Ministry of Agriculture and Forestry (2019-2023) <p>A1: Raising welfare in rural areas, ensuring stable food supply by increasing yield and quality in agricultural production</p> <p>A3: Protecting fisheries and aquaculture resources, ensuring their sustainable operation</p> <p>A6: Conserving biodiversity and ensuring its sustainable management</p> <p>A7: Developing institutional capacity</p> <p>A4: Ensuring sustainable management of soil and water resources</p>
	National Energy Efficiency Action Plan 2017-2023 <p>T1-Encouraging the Renewal of Tractors and Combine Harvesters with more Energy Efficient versions</p> <p>T2-Transition to Energy Efficient Irrigation Methods</p> <p>T3-Supporting Energy Efficiency Projects in the Agriculture Sector</p> <p>T4-Encouraging the Use of Renewable Energy Resources in Agricultural Production</p> <p>T5-Identification of Agricultural By-Product and Waste Potential to Obtain Biomass and Promoting Its Use</p> <p>T6-Supporting Energy Efficiency in the Fisheries and Aquaculture</p>	
	National Rural Development Strategy <p>Priority 1.1 Improving the competitiveness of the agriculture and food sectors</p> <p>Priority 2.1 Ensuring the sustainability of soil and water resources</p> <p>Priority 2.2 Ensuring effectiveness in the use of agricultural land</p> <p>Priority 2.3 Ensuring the sustainability of forest resources</p>	National Basin Management Strategy (2014-2023) <p>Goal 1: Strengthening legal and institutional capacities for sustainable management of basins, ensuring coordination and cooperation between institutions and stakeholders</p> <p>Goal 2: Sustainable management and use of water resources of the basins</p> <p>Goal 4: To protect and manage the biological diversity, natural and cultural landscape resource values of the basins and to ensure the sustainability of ecosystem services.</p>



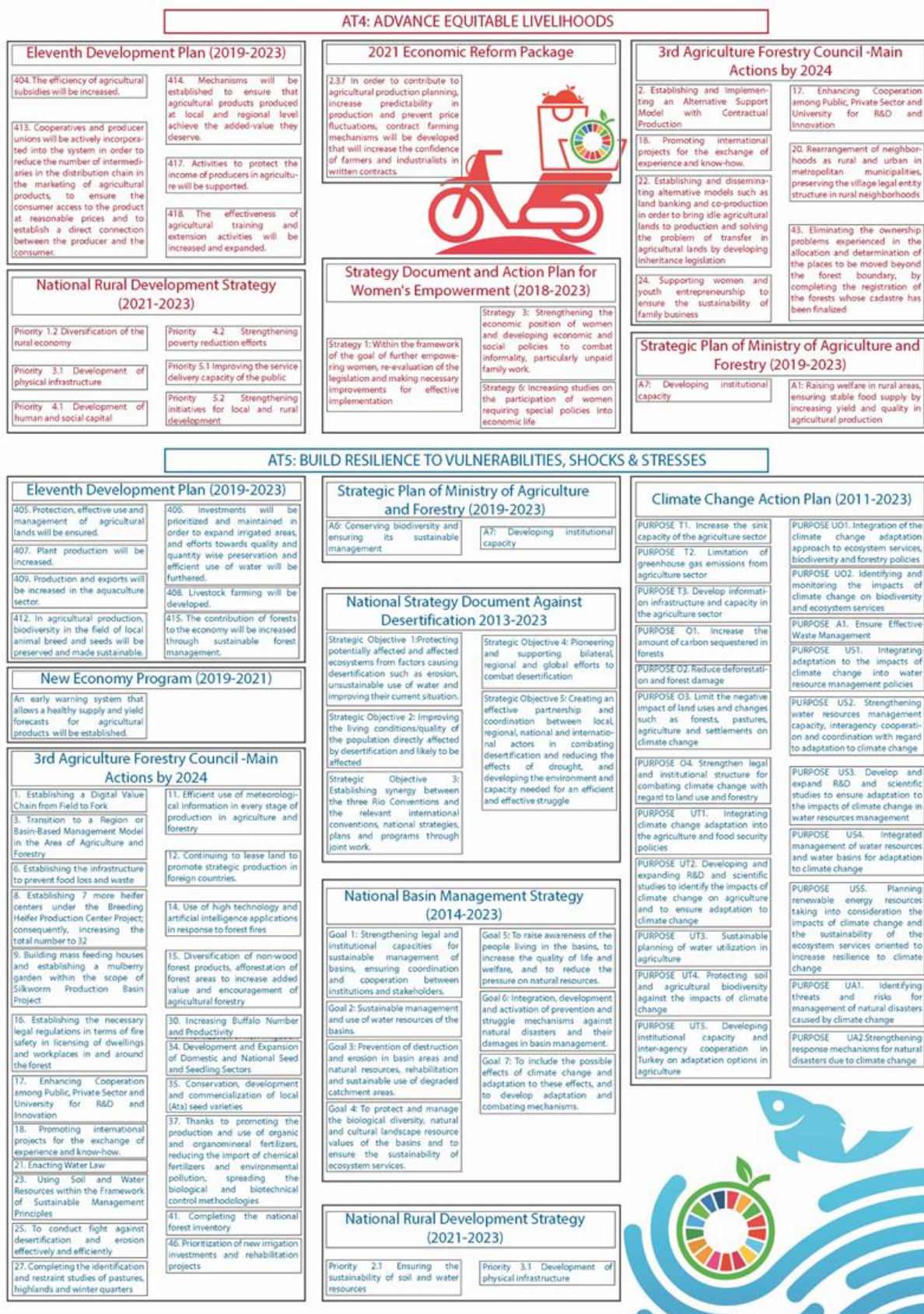


Figure 23. Relationship of National Pathway Action Tracks with Other National Strategy and Documents

Besides commitment to national plans and programs, Turkey attaches great importance to international cooperation for the development of sustainable food systems. Turkey collaborates with many international organizations, particularly UN agencies, on the field of agriculture, food and forestry and hosts many of them at regional and office level. In that context, through partnership programs with international organizations, Turkey shares its experience and know-how with regions ranging from Central Asia to the Balkans, Caucasasia and Africa.

The prominent international activities (program, projects, initiatives etc) of Turkey that lead the way for the development of sustainable food systems can be listed as such:

- Launch of an international campaign titled “SAVE YOUR FOOD” to reduce food loss and waste under the Ministry of Agriculture and Forestry in cooperation with FAO. Launching the national campaign on May 20, 2020, and implementing the sub-campaign called “I Promise” on a national scale,
- Establishment of the Black Sea Economic Cooperation (BSEC) Sustainable Food Systems Regional Cooperation Center in cooperation with FAO and BSEC and undertaking the country coordinatorship of the BSEC Agriculture and Agri-Industry Working Group in the last two terms.
- Launch of the project of “Reduction of Food Losses and Waste in the Central Asian Countries (Turkey, Azerbaijan, Kazakhstan, Tajikistan, Turkmenistan and Uzbekistan) in 2020,
- Establishment of the Food Security Regional Coordination Center within the Economic Cooperation Organization,
- Organization of the “2nd Meeting of the BSEC Ministers of Agriculture” themed “Sustainable Food Systems and The Future of Aquaculture” in Turkey on May 2017,
- Hosting the 1st Meeting of the Ministers of Agriculture of Turkey-Africa and the Agribusiness Forum in 2017,
- Establishment of the “Technical Platform on the Measurement and Reduction of Food Loss and Waste” in collaboration with FAO, was initiated in the “G20 Leaders’ Declaration” during Turkey’s 20 Presidency in 2015.
- Turkey became a donor country within the scope of FAO Turkey Partnership Programs (FTFP and FTTP) and hosts the FAO-Central Asia Sub-Regional Office (FAO-SEC)
- Undertaking the Presidency of the General Assembly of the Islamic Organization for Food Security (IOFS) of the Organization of Islamic Cooperation in 2020 and carrying out the membership of the Executive Board,
- Hosting IFAD's sub-regional office in Istanbul to develop cooperation with Azerbaijan, Bosnia and Herzegovina, Georgia, Kyrgyzstan, Lebanon, Moldova, Tajikistan, Turkey and Uzbekistan,
- Strengthening food systems and sensitive value chains related to agriculture and forestry through Agriculture and Forestry Programs carried out under the coordination of the Ministry and FAO,
- Implementation of the Project of Increasing Improvement, Income, Development and Providing Ecosystem Services, also known as the Bridges from Turkey to Africa Project, in Sudan, Mauritania and Eritrea since 2019.

9. KEY MILESTONES AND FUTURE TRENDS

The Ministry of Agriculture targets to open irrigated land for 2 million hectares in 2018-2023. This will be quite important for the productivity of agricultural land. Diversifying the diets in the following decade will be important regarding agriculture and health policies. Turkey continues its sustainable efforts.

Transforming food systems to more sustainable ones requires a long-term focus and a coherent set of commitments and actions. The challenges of malnutrition, health and the environment are all fundamentally interlinked. Policy coherence in these areas needs to be strengthened.

Mitigating the effects of COVID 19 are very needed to ensure food security and that nutritional needs of all individuals are met (such as social protection measures, breastfeeding, infant and young child feeding, healthy diets consumption, true info on diet-related diseases etc). Also, food systems should be shaped with the aims of being more resilient to the shocks, natural disasters and being financed in a more optimum ways, eliminating poverty and inequalities, physical access to the food for all with the affordable prices, improvement of agri-food trade that are negatively affected by COVID-19. Better governance and coordination between not only national but also regional and global actors should be ensured towards improvement of food systems.

Land consolidation area for which registration procedures are expected to be completed until 2023 with an increase of 2,6 million hectares of area as indicated in 11th National Development Plan. Land consolidation projects remain to be on urgent agenda in order to increase production efficiency in agriculture and transform into sustainable agriculture. Turkey will continue its efforts on land consolidation with firm steps which will make a remarkable contribution to the transformation of food systems in Turkey.

Increasing use of smart technologies in agriculture along with disseminating digitalization among agri-food system actors is another crucial milestone that the pathway intends to achieve. Turkey has shown great improvement in digital access. Turkey ranks 5th in digital access out of 150 countries for improvements in network coverage, performance, and availability. 97% of inhabitants have mobile subscriptions. This coverage rate presents many opportunities to integrate digital solutions to Turkey's food system. Digital agriculture is already supported by the government, approximately US\$26.5 million of the 2019 budget has been dedicated to digital agriculture solutions (FAO, 2021). Under MOAF coordination several national data sets and the digital services established and used for improving agricultural service, including: National Geographic Information Systems, Farm Accountancy Data Network, Land Parcel Identification System, Integrated Management and Control System, Agricultural Information Network, Farmer Registration System, Animal Registration System, Farmland Registration System and Village Database. These systems also support product verification and tracking, national research programs, map and satellite imagery production, and other key Ministry operations. Continuing the improvement of those data sets and establishing needed ones will benefit all stakeholders along the value chain, increasing efficiency, equitability, and profitability of food systems while simultaneously reducing environmental impact (FAO, 2021).

As another focus in this context Turkey will disseminate digital literacy and use of smart applications among small holders and women and youth of rural areas via custom training programs and support mechanisms.

One of the commitments of Turkey will be implementation of School Nutrition, School Milk and School Food Programs since feeding the next generation with nutritious food will play a vital role in the sustainable food systems.

Turkey preserve its commitment to perform actions and main actions as a result of 3rd Agriculture and Forestry Council in line with the Summit.

Turkey also commit to perform actions and main actions as a result of Water Council in line with the Summit.

10.MONITORING AND EVALUATION

In order to transform national food systems towards achieving SDGs up to 2030, identification of game changing strategies and relevant actions is an important attempt however this process needs to be complemented by an effective implementation of suggested measures and actions. Thus, monitoring and evaluation of the implementation of the pathway is crucial for assessing how close Turkey is to achieve SDGs. Since implementation of the national pathway is a collective effort of many institutions, determined as responsible or relevant for each action, monitoring and evaluation process too requires cooperative and holistic approach.

Monitoring and evaluation of the national pathway cannot be isolated from the monitoring process of other national strategy documents that are integrated in the pathway. Progress of implementation of actions cross cutting among different national documents shall be informed and shared among responsible authorities. Required coordination for gathering and assessing action's progress can be undertaken by MoAF. MoAF also runs the monitoring process of 46 main actions and their sub-actions determined and disclosed based on the results of the 3rd Agriculture and Forestry Council. These actions are monitored quarterly until the end of 2023 and the results of the implementation are announced to the public. Therefore, this monitoring process will also feed the monitoring process of the national pathway in the sense that they share common goals and action suggestions. Under MoAF coordination, national pathway implementation results can be gathered and monitored yearly upon feedback from institutions responsible for the actions. Evaluation reports based on this annual process could be drawn and collective discussions regarding the necessary updates and responsive actions for the national pathway shall be made upon findings of these reports.

National pathway's action time line (implementation period) reaches up to 2030. However, some actions in the pathway that are also stated in national action plans and strategies have different deadline mostly up to 2023. For instance, 46 main actions determined and disclosed based on the

results of the 3rd Agriculture and Forestry Council are committed to completed until the end of 2023. Completion times of the actions stated in the pathway will also be assessed and revised accordingly in monitoring and evaluation process.

CONCLUSIONS

Food systems must be in better compliance with the objective of supporting sustainable, healthy diets and achievement of the Sustainable Development Goals by 2030. Transformation of food systems needs to be done at every stage from farm to fork. This will closely be related to inadequate availability, physical accessibility, affordability, and desirability of improved diets.

According to The Food Security Index, Turkey is a strong country regarding proportion of population under the global poverty line, sufficiency of supply, micronutrient availability, market access and agricultural financial services, food safety, protein quality and food safety net programs. Turkey is self-sufficient in many crops and fruit and vegetables. But the losses in harvest and post-harvest are too high. Therefore, reducing food losses and waste will contribute significantly to ensuring food security not only for Turkey but also for the needs of world.

The country report on food systems was prepared in 2019. the National plan and strategies on agriculture and rural development clearly indicate that remarkable work has been conducted so far by the Ministry of Agriculture and Forestry in collaboration with other Ministries and organizations. Also, the results of Agriculture and Forestry Council to be valid until 2023 are quite good baseline for a well functioned food system transformation.

Small scale farmers in Turkey are one of the most important actors of food systems when considering their strong impact in food production. To develop some financial mechanisms for small holders are essential. The environmentally friendly production made by those groups at sufficient scale are very important regarding food security. Developing marketing channels for those is also another important instrument in transformation of food systems in Turkey.

Malnutrition, ecological degradation and natural disasters are mainly borne by the public sector and society. So, policy instruments and support mechanisms will be shaped to strengthen the current situation of the environment, plant, animal and public health and also it should create decent jobs and income growths.

Evaluating and reusing the wastes released from the production processes of the factories operating in the food industry, including the fruit and vegetable processing industry, will enable the addition of minerals essential for human nutrition to the diet and the production of new additives with high antioxidant content, thus enabling the production of new foods that can help improve human nutrition. Additionally, Turkey will implement School Nutrition, School Milk and School Food Programs since feeding the next generation with nutritious food will play a vital role in the sustainable food systems.

Greater resilience must be built into local and global food systems taking into consideration of COVID-19 pandemic's effects on the agri-food sector. Climate change is one of the key drivers of food insecurity. Mitigating the effects of COVID 19 are very needed to ensure food security and that nutritional needs of all individuals are met (such as social protection measures, breastfeeding, infant and young child feeding, healthy diets consumption, true info on diet-related diseases etc). Also, food systems should be shaped with the aims of more resilient to the shocks and natural disasters. Better governance and coordination between not only national but also regional and global actors should be ensured towards improvement of food systems.

In general, small holders cannot save capital to create a viable business since they operate at low levels of resource efficiency and output. These small-scale farmers are generally risk averse and do not want to take risk for the new methods and applications. Hopefully, agricultural insurance is developing year by year and the number of beneficiaries increases at a significant rate. Moreover, Regional Development Agencies in Turkey implement some business models which includes accelerator programs that bring universities, technology firms and farmers on the same platform via matching their needs in order to increase the productivity and welfare standards of farmers. These programs seem promising for farmers including subsistence farmers as well as traditional food and machinery companies.

Also reducing food losses and waste significantly contributes to ensuring food security. For this aim, Turkey launched the Save Your Food Campaign in 2021. Turkey in the next decade will make considerable contributions to the sustainability of the global consumption and production agri-food system through the prevention, reduction and management of food loss and waste.

As indicated in the National Rural Development Strategy of Turkey covering 2021-23, small-sized enterprises will be developed, agricultural productivity will be increased, quality of life will be improved and human and social capital will be strengthened in rural areas. The level of integration of these regions with the national market and other areas will be raised and the quality of and the accessibility to education, health including improving the level of nutrition in food, communication and local government services will be improved. The rural workforce, especially women and young people, who have left their job in the agricultural sector but continue to reside in rural areas, will be directed to agricultural or non-agricultural production activities, by cooperating with other ministries, relevant institutions and organizations.

Transforming food systems to more sustainable ones requires a long-term focus and a coherent set of commitments and actions. The challenges of malnutrition, health, and the environment are all fundamentally interlinked. Policy coherence in these areas needs to be strengthened. Expanding the production of legumes as an alternative protein source and taking more part in consumption at reasonable prices is so important for accessing nutritious food, particularly for vulnerable groups.

The regions and cities through development agencies and local administrations will be encouraged to develop their own regional food systems strategies on the basis of the National Pathway. Turkey will continue its efforts towards the achievement of the Sustainable Development Goals with all its stakeholders, and at the same time, emphasis will be placed on strengthening national, regional and international cooperation by 2030.

To sum up, in this pathway, on the basis of a very comprehensive stakeholder analysis, the strategic targets, objectives and concrete actions in line with the other strategic documents have been identified. In order to achieve these goals, put in this pathway, the food supply chain will be strengthened through infusion of technology and digitalization in agriculture services by MoAF. Increasing the productivity of small holders who are one of the weakest linkages in the food chain will be one of the main targets of this pathway. The marketing channels and accessing finance will be improved with new models. The institutional capacity of agricultural cooperatives will be improved and encouraged in the financial support mechanisms in collaboration with relevant institutions. In this pathway, digitalisation and agricultural extension are considered as cross-cutting issues that affect all processes in the transformation of Turkish food systems. Therefore, dissemination of novel agricultural practices and technological progress with the help of agricultural extension services are quite essential. In this regard, the universities will be more integrated in the extension services. Public-private partnership launched by the Ministry of Agriculture shall continue with firm steps. The programs which are currently implemented on organic agriculture and good agricultural practices will be extended all over Turkey. The new instruments which are required under the transformation of food systems will be covered in the curricula of agricultural programs. The harvest losses and post-harvest losses will be reduced with strict measures and campaigns. Regarding climate change, protecting natural resources applications will be improved via efficient use of groundwater, chemicals, fertilizers used in the agriculture sector will be monitored and evaluated with new systems. Under regional food systems, the cities will be encouraged to develop urban agriculture practices including vulnerable groups so as to increase access to nutritious food.

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