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FOOD SYSTEMS ASSESSMENT

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Acronyms and abbreviations

ACSA	National Agency for Rural Development
AIPA	Agency for Intervention and Payments in Agriculture
BSEC-CSFS	Organization of the Black Sea Economic Cooperation, Centre for Sustainable Food Systems
CFS	Committee on World Food Security
CIS	Commonwealth of Independent States
CSA	Climate smart agriculture
CVD	Cardiovascular disease
DCFTA	Deep and Comprehensive Free Trade Area
EIB	European Investment Bank
ENPARD	European Neighbourhood Programme for Agriculture and Rural Development
EPI	Environmental Performance Index
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FLW	Food loss and waste
GDP	Gross domestic product
GHG	Greenhouse gas
MAC-P	Moldova Agriculture Competitiveness Project
MARDE	Ministry of Agriculture, Regional Development and Environment
MARDS	Moldova Agriculture and Rural Development Strategy
MIEPO	Moldova Investment and Export Promotion Organization
MOVCA	Moldova Organic Value Chain Alliance
NBS	National Bureau of Statistics
NCD	Non-communicable disease
NDS	National Development Strategy
NGO	Non-governmental organization
NIF	Neighbourhood Investment Facility
NSFA	National Food Safety Agency

R&D	Research and development
SDGs	Sustainable Development Goals
SEC	Sub-Regional Office for Central Asia
SME	Small and medium-sized enterprises
SPS	Social Protection System
UASM	State Agrarian University of Moldova
UN	United Nations

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Executive summary

This Rapid Food System Assessment provides an initial overview of the key components of the Moldovan national food system. It consolidates, analyses and helps make sense of existing data to describe the main challenges and opportunities of Moldova's food systems and provides ground for further discussions to contribute to more evidence-based decisions and interventions to address negative outcomes and improve food systems sustainability. Based on a framework developed by the World Food Security (CFS)'s 2017 High Level Panel of Experts (HLPE, 2017), the key areas of analysis include **food system drivers** (external factors affecting the decisions of producers, intermediaries and consumers), **food supply chains** (production systems, storage and distribution, and retail and marketing), **food environments**, **consumer behaviour** and **diets**, as well as **food system outcomes** including nutrition and health outcomes, the economic, social and environmental impacts of food systems, and relevant **policy, programmes and institutional actions**.

Food systems drivers. From a **biophysical and environmental perspective**, Moldova is blessed with a very rich soil, a wide network of rivers and lakes, and a mild, moderately continental climate favourable for agricultural production. However, the country's agriculture is impacted by the negative effects of climate change and is prone to natural disasters. Alongside floods, **drought** is a **major risk** with severe economic consequences, as the majority of the population depend on agriculture for income. Such risks constitute a major determinant of human development in Moldova, compromising the progress of health and nutrition goals.

Demographic drivers play a **considerable** role in Moldova's food system, both in terms of production and consumption, due to the country's steadily **decreasing population** since 2000 (World Bank, 2020a). This is due mainly to **massive emigration** to the European Union and the Russian Federation over the past two decades, as a result of poverty and harsh economic conditions in the country. At the same time, Moldova remains a predominantly rural country with the share of the population living in cities accounting for only 43 percent (World Bank, 2020b).

Moldova is among the **top 15 countries** with the **largest share of remittances** from abroad (World Bank, 2020c). An estimated **1 million Moldovans have left their homeland** since early 2000, with migrant remittances to Moldova accounting for 15–25 percent of the country's GDP, depending on employment market conditions abroad (World Bank, 2018a: 27).

Moldovan agricultural development and efficiency depend on government spending and private investment in the sector. However, a considerable **decrease in government spending** on **agriculture** over the past two decades combined with **political instability**, inflation, imperfect legislation, **underdevelopment of production** and **social infrastructure**, lack of guarantees of free and honest competitive entrepreneurship, uncertainty about the final costs of production and other reasons have

collectively created an unattractive investment climate, hampering the flow of investments to the agri-food sector and contributing to a **massive outflow of FDI** from the country.

Food supply chains. Agricultural land in Moldova accounts for approximately 69 percent of the country's land (FAO, 2019a). Of this area, 74.7 percent is arable land for annual crop production where **maize, wheat, sunflower, barley, oilseed, soybean, sugar beet**, **grape, apple** and **tomato** are produced (FAO, 2019b). The **highly fertile black chernozem soils** offer adequate conditions to carry out farming activities. However, during recent decades, these soils have degraded and eroded as a result of land fragmentation and low land management capacity, inadequate practices that affect soil health, overgrazing, illegal logging of protective forest belts and general inefficiencies in land-use planning including crop rotation. At the same time, **organic farming is on the rise** constituting 7.6 percent of the total agricultural area (FAO, 2019c), approaching the EU average.

A very high level of land fragmentation is a persistent problem in Moldova that past policies and support programmes have failed to address effectively, hindering the ability of farmers to take advantage of economies of scale. Cooperatives are not popular among Moldovan farmers due to lack of trust, efficiency and know-how, despite available financial support mainly from EU and UN programmes. Almost 98 percent of farmers in the country are small-scale producers with an average farm size of 1.5 hectares (ha) (FAO, 2019c) with only limited access to supply chains of modern food retailers due to their inability to meeting the basic requirements of quality standards and supply volume. However, traditional agro-markets remain very popular among the majority of Moldovans, enabling smallholders to sell their surplus and contribute to the availability and accessibility of food for the country's population.

Food manufacturing industries that process domestic and international agricultural raw materials into food are rare in Moldova compared to other countries of Eastern Europe. Large-scale processors are often not able to secure domestic raw materials in sufficient volume on a consistent basis due to lack of capacity among farmers, which fosters dependency on imported materials. However, small-scale processors usually procure raw materials locally. The lack of horizontal and vertical coordination of supply chains has placed constraints on the growth of the agri-food industry resulting in low levels of international competitiveness for the agri-food sector overall.

Transportation, storage and distribution of agri-food products in Moldova is not adequate, sufficient or effective enough to prevent food loss and waste (FLW) along the supply chain. **Lack of investment in technology, rural infrastructure and transport** at various stages of the value chain, such as drying, storing, including cold storage, and transporting crops and agri-food products, has led to increased produce losses over the past decade.

Moldova has a **limited network of modern grocery retailers** and supermarkets which are mainly concentrated in major cities. Traditional agro-markets remain the main and often the only choice available in rural areas.

Food environment. The presence of modern grocery retailers and supermarkets in Moldova today is higher than the world average but lower than in Eastern Europe (FSD, 2020). This is due mainly to the habits of the older generation who prefer to buy food from open-air food markets based on a perception of lower prices and better quality of food products. Nevertheless, the propensity of the population to shop at modern retail stores and supermarkets has increased considerably during the last decade exacerbated by the 2020 pandemic. This trend is likely to continue.

Food availability is not a major concern for Moldova's food system. Equally, accessing food poses no particular difficulties although limitations in terms of diversity and availability of certain food products may be a concern in rural areas where modern grocery and ready food outlets are still rare. **Affordability of food**, especially, **healthy food**, is the **main issue for the majority of Moldovans**. **Very low wages** and **incomes** hinders many Moldovans from deviating from a set of basic food choices, which often feature less healthy foods.

Consumer behaviour. There have been changes in consumer behaviour in Moldova over the last decade thanks to the large and steady flow of remittances. An estimated 25 percent of Moldovans spend a considerable amount of their income on food – in addition to basic foods. At the same time, price remains the main driver of consumer behaviour for most people, often resulting in the selection of cheaper and less healthy food options. People are also increasingly attracted to the convenience offered by modern retail outlets with numerous products under one roof. Urban consumers with higher incomes have become more interested in niche products that they perceive as exclusive or healthy, but are also increasingly aware of environmental and ethical considerations related to supply chains, thanks to various social campaigns supported by the government and international development actors.

Regarding food consumption location, eating out has gained in popularity among the population over the past decade, although most Moldovans still prefer to consume traditionally prepared home-made food in their households. The development of smart technologies and advanced food delivery services has also prompted greater indoor consumption of food.

Diets. Over recent decades, many Eastern European countries, including Moldova, have seen shifts in nutritional and dietary patterns. In general, these changes include reduced consumption of fibre-rich foods such as legumes, fruits, vegetables and whole grains, and increased consumption of processed foods, which are often high in calories, fat, sugar and salt.

The diet of most of the country's population is based on traditional Eastern European or Balkan cuisine which is present throughout Eastern and South-East Europe. It is notable that cardiovascular disease (CVD) and cancer mortality rates in Eastern Europe are among the highest in the world (WHO, 2018). Some research has concludes that, although diet is an important risk factor, traditional eating habits in this region may contribute to poor health status, particularly the high CVD mortality rates of populations in Moldova and other Eastern European countries. Very high levels of alcohol consumption are also considered to be a primary risk factor. Adequate public health nutritional interventions in this region are therefore essential, and some awareness-raising and public campaigns are already being implemented.

Outcomes. The agricultural sector in Moldova is the main component of the country's food system and despite its stagnation over the past decade is still considered the backbone of the national economy. The same is true in regard to its contribution to GDP and effect on the employment rate. The agricultural sector employs a significant number of people, especially when subsistence agriculture is taken into account, although overall contribution to GDP is low relative to the number of people employed by the sector.

Despite its critical importance to the food system of the country, the performance of Moldovan agriculture, and the agri-food industry in particular, has been uneven. Growth has been slow and highly variable with **very low agriculture productivity** and **incomes**. Despite an overall positive trend in labour productivity over the past decade, productivity remains 3.5 times lower than the Eastern European average.

The Moldovan trade balance features an overall surplus stemming from production of agri-food products. The agri-food industry is the most important sector within the Moldovan processing industry, accounting for over 40 percent of the industry, although this share has decreased markedly from 52 percent in 2009. Two-thirds of all exports originate from the agri-food sector.

The prevailing agricultural practices in Moldova raise environmental concerns. Inappropriate storage and use of agrochemicals and manure and inadequate nutrient management practices have contributed to pollution of surface and groundwater sources and even to increases in the agricultural sector's contribution to national greenhouse gas (GHG) emissions (mainly through inadequate management of nutrients and soil tillage).

Malnutrition levels among the Moldovan population are relatively low across all categories – stunting, wasting and underweight. Food insecurity is not a major challenge for the country but can be felt in low-income households, especially when high production and price volatility affect food availability and access. Most food-insecure households are headed by men and located in vulnerable urban areas.

Political and institutional governance. Moldova has a number of key institutions and national strategies, policies, programmes and projects that have been designed and implemented during the last decade to help build a sustainable and efficient agriculture and food industry sector, as well as raise awareness and boost sustainable production and consumption of food products in Moldova. However, despite considerable foreign aid and technical assistance by various donors (mainly the European Union) and international developing agents (the UN and bilateral cooperation agencies), Moldova has yet to successfully transition from conventional and non-efficient food systems to modern, sustainable and well-functioning alternatives.

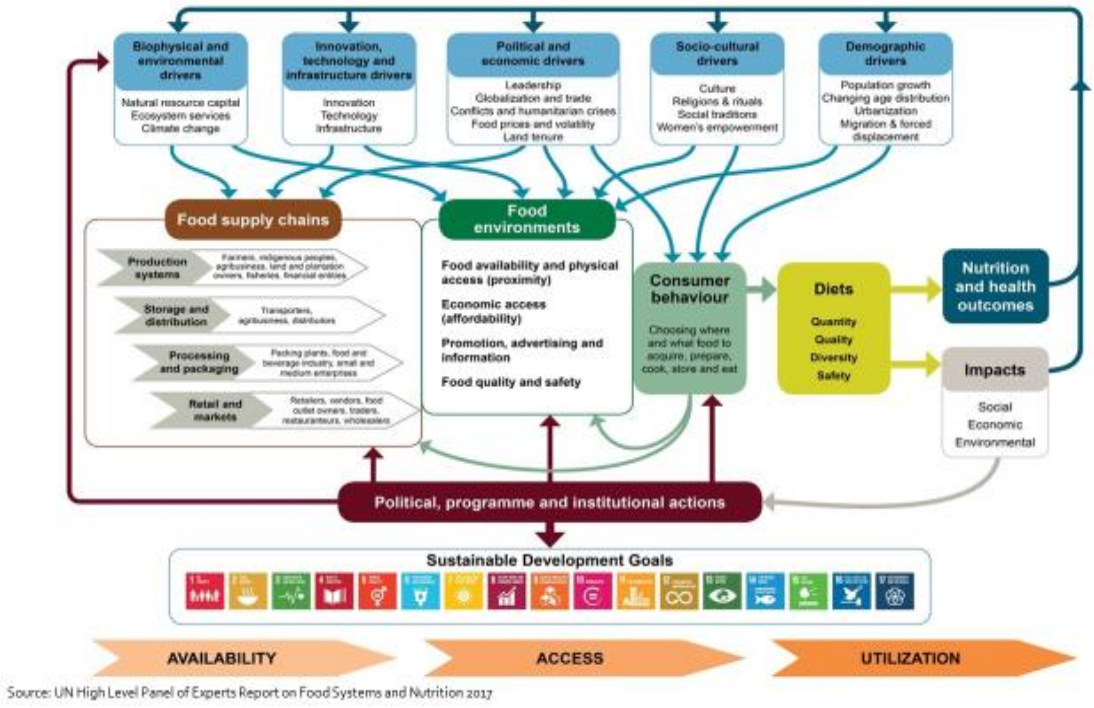
Toward food systems sustainability in Moldova. The following non-exhaustive list of topics and specific issues, which surfaced from data analysis and discussions with stakeholders engaged in the project, could be recommended for consideration by relevant authorities and decision makers: governance for developing sustainable food systems; climate change adaptation for agriculture and promotion of a climate smart agriculture (CSA) approach; research, innovation and education; collaboration and production development; and food loss and waste reduction and prevention.

Chapter 1. Rapid food systems assessments

Food systems approaches continue to grow in popularity and importance as policymakers and governments recognize their critical importance for achieving the SDGs by 2030. This trend is apparent in events such as the UN Food System Summit, COP 26 (with an increased focus on food and agriculture) and the Nutrition for Growth summit. The present report seeks to provide inputs into food system thinking in Moldova. Annexes 1 and 2 provide the conceptual framework for sustainable food systems and the applied food assessment methodology, respectively.

The analysis is based on two recently developed frameworks: the 2016 Global Panel Report on Agriculture and Food Systems for Nutrition and the Committee on World Food Security's (CFS) 2017 High Level Panel of Experts on Food Security and Nutrition report *Nutrition and Food Systems*. Figure 1 illustrates this conceptual framework of food systems for diet and nutrition.

Figure 2. Conceptual framework of food systems



Source: HLPE (2017).

Chapter 2. Food systems drivers

2.1. Biophysical and environmental drivers

The agricultural sector of the Moldovan economy is the sector most vulnerable to climate change. According to the Environmental Performance Index (EPI), Moldova is ranked 87th out of 180, which indicates existing difficulties across a number of indicators (Wolf *et al.*, 2022).

Over the past decades, the following climatic changes have occurred in the Republic of Moldova:

- The annual air temperature has seen a sharp increase since 1980 of approximately 0.58 °C per decade.
- Seven of the ten warmest years in Moldova's history occurred within the last 20 years.[1]
- From 1980 to the present, there has been an increase in spring rainfall and a decrease in summer rainfall. Over the same period, both autumn and winter seasons and annual average precipitation have seen a gradual rainfall increase of 66 mm.[2]
- Since 2009, emissions of CO_2eq have increased by 30.8 percent, including CO_2 by 31.3 percent, CH_4 by 2.8 percent and N_2O by 84.4 percent (FAO, 2018a).
- Average annual temperature is projected to increase by 2.41 °C (from 1.07 ° C to 4.09 °C) in 2040–2059 and annual precipitation is projected to decrease by 19.11 mm over the same period (RCP 8.5, ensemble).[3]

The territory of Moldova comprises forest-steppe and steppe zones. The country is prone to natural disasters such as droughts and floods which have a negative impact on agricultural production. However, the Global Climate Risk Index for 2019, which reflects the level of exposure and vulnerability to extreme events, ranks Moldova 130th, indicating a relatively low vulnerability to abrupt changes in climatic phenomena (Eckstein, Hutfils and Winges, 2018).

2.2. Innovation, technology and infrastructure drivers

Agriculture depends heavily on government spending and investment in the sector. However, government spending on agriculture has decreased by 8.9 percent over the last ten years (FAO, 2019d)

[1] https://climateknowledgeportal.worldbank.org/country/moldova/climate-data-historical

[2] https://climateknowledgeportal.worldbank.org/country/moldova/climate-data-historical

[3] https://climateknowledgeportal.worldbank.org/country/moldova/climate-data-projections

and the investment climate is not sufficiently favourable to attract potential foreign investors. According to FAOSTAT, total FDI inflows decreased by 15.7 percent over ten years while total FDI outflows increased 5.7 times (FAO, 2019e-f). The inflow of private national and foreign capital is hampered by political instability, inflation, imperfect legislation, underdevelopment of production and social infrastructure, insufficient information support, lack of guarantees of free and honest competitive entrepreneurship, uncertainty about the final costs of production and other reasons.

In recent years, credit to agriculture as a share of total credit accounted for no more than 7.5 percent of all loans (FAO, 2019g). In 2010–2011, the volume of lending to agriculture was twice the current level, which helped the agro-dependent country stay afloat during the post-crisis years. Concerning railroad infrastructure, rail line density (total route in km per 100 square km of land area) has not changed since 2009 (FAO, 2018f). Rural infrastructure development could help re-emphasize the importance of agriculture as an economic activity, especially since rural areas are the main providers of food for urban populations.

2.3. Political and economic drivers

Political stability largely determines the actions of producers and also influences the population's decision-making around migration. The need to ensure political stability can function as an impetus for the development of the agricultural sector as well as domestic production and consumption. In 2019, Moldova had a negative ranking on the Political Stability and Absence of Violence/Terrorism index (World Bank, 2021a), having achieved a measure of stability a few years ago, before reverting to the negative position of 2009. The country's situation when evaluated by the Voice and Accountability Index is similar (The Global Economy, 2021a).

Moldova's GDP has doubled over ten years reaching USD 11.86 billion in 2019 (World Bank, 2020d). However, it is necessary to take into account the low base of 2009 – the years of crisis and economic recession (World Bank, 2020d). Moldova's GDP per capita has also doubled during the same period, but remains almost ten times smaller than that of other European countries (FAO, 2019h). In terms of added value, agriculture accounted for 9.9 percent of GDP in 2019, growing 2 percent since 2009 (FAO, 2019i). The contribution of the sector to country's GDP in much higher than in European countries, where this figure does not exceed 1.8 percent on average. Moldova is still heavily dependent on the agriculture and agri-food sector, with agriculture providing over 50 percent of total export revenues. More than 40.7 percent of the total agricultural area of the country belongs to 390 380 individual owners in a context where large-scale agri-holdings are uncommon.

Population income is one of the main indicators of human development. Income enables households to participate in educational and social services and to shape demand and consumption. Annual growth in GNI per capita fluctuates from year to year, indicating unstable welfare among the population. After a

series of crises, both financial (2008–2009) and political (2012), exports decreased in 2014 due to the transition to a free trade regime with EU countries and the introduction of bans and customs duties by the Russian Federation on the supply of a number of Moldovan products. Simultaneously, the withdrawal of USD 1 billion from the country's banking system provoked a devaluation of the leu, the national currency, leading to an increase in prices. This led to a subsequent decrease in the growth rate of disposable income among the population (FAO, 2019j). Today, the ratio of income share held by the highest 20 percent to the lowest 20 percent is 3.6, indicating considerable improvement compared to 2009 when the ratio was 5.34 (World Bank, 2019c). The GINI index indicates a decrease in inequality from 32.9 in 2009 to 25.7 in 2018 (World Bank, 2018b). The poverty headcount ratio at USD 1.90 a day (2011 PPP) is also declining, indicating a positive trend (HumanProgress, 2017; UN Data, 2017).

Trade accounted for 87.4 percent of Moldova's GDP in 2019 (World Bank, 2019a). From 2011 to 2017, the indicator presented a negative trend, progressing to a positive one in 2018–2019. Due to a variety of reasons, the country is not well integrated into global supply chains. Agricultural products account for the largest share of exports accounting for approximately 45 percent of total export volume annually (International Trade Administration, 2022).

The cereal import dependency ratio (three-year average, cereal imports minus exports as a percentage of total domestic supply) has decreased over the past ten years. In particular, imports of wheat decreased by 42.3 percent while exports increased by 63.2 percent due to increased production, including of organic crops (FAO, 2018b). Maize imports and exports show a similar trend (FAO, 2019k-l). The value of food imports in total merchandise exports (percentage, three-year average) decreased by 16 percent over the same period (FAO, 2019m).

Moldova is one of the 20 largest wine suppliers worldwide. Vineyards in Moldova occupy more than a quarter of the country's territory, amounting to 150 000 hectares, and the number of people employed in the sector exceeds 25 percent of the working-age population (Wine Business International, 2019).

Moldova also ranks in the top ten countries for the production and export of walnuts. Other goods for export include sunflower seeds and sunflower oils, unrefined sugar, fruits (apples, pears, grapes and pitted fruits), honey and spirits.

Moldova also imports food products where domestic production is not sufficient to meet consumption demand. A notable example is fish and seafood, as Moldova is a landlocked country. While fish farming is being developed in lakes and reservoirs, domestic fish production capacity remains limited.

2.3. Sociocultural context

Moldova is a country with a fairly high level of education. The literacy rate among adults (ages 15+ years) is 99.6 percent (World Bank, 2021b), and 82.1 percent of adolescents graduate from secondary school (World Bank, 2017b).

A WHO study[4] has shown that the influence of Western diets is increasing, which raises concerns about the high sugar content of soft drinks, which as in other countries constitutes the main sources of added sugar in diets and is also likely to be the root cause of excess calories and weight gain. Adolescents in Moldova often resort to street food, which negatively impacts their health due to the high levels of salt, trans fats and sodium, and have a low level of fresh vegetable and fruit consumption.

2.4. Demographic drivers

The population of the Republic of Moldova is about 2.6 million people but recent years have seen an annual decline of about 1 percent (World Bank, 2020a), resulting in a decrease of 250 014 people (nearly 8.7 percent) since 2009. The population is also gradually aging. The share of the population under the age of 14 was 18–20 percent during the period 2009–2019, having risen slightly since 2013 (World Bank, 2020f), while the working-ag population (71.6 percent) has decreased every year since 2009 at a rate of 0.6–0.7 percent (World Bank, 2020g). The population aged over 65 has reached 13 percent (World Bank, 2020h), the highest level in a decade. The proportion of employed people among the overall population is 37 percent.

Migration processes have also contributed to population decline since the early 1990s. Neighbouring Romania has allowed Moldovans to obtain Romanian (EU) citizenship, while the Russian Federation has facilitated legislation for the employment and legalization of Moldovans in the country. As a result, Moldova has experienced a massive exodus of urban and rural populations, especially since early 2000. The “brain drain” phenomenon is a significant issue and has increased in intensity over the last ten years. It should be noted, however, that migration to Europe and the Commonwealth of Independent States (CIS) differs in qualitative composition: the former is largely associated with more qualified professionals from urban areas, while the latter is due to demand for low-skilled labour which is largely met by the rural population. Massive emigration for economic reasons has been amplified by political instability in the country. This process has also had a negative impact on the development of science and technology and research and development (R&D) in agriculture, among other sectors.

It is estimated that almost 1 million Moldovans work abroad. Migrant remittances to Moldova account for 15–25 percent of the country’s GDP (World Bank, 2020c), depending on employment market conditions in the CIS, and come mainly from the Russian Federation and the European Union. This

[4] www.euro.who.int/__data/assets/pdf_file/0006/371139/feed-moldova-rus.pdf

percentage represents the highest value for the indicator among BSEC countries. Moreover, according to the World Bank, Moldova is among the top five countries with the largest share of remittances from abroad in GDP in the world.

After 30 years of independence, structural reforms and development, Moldova still remains the poorest country in Europe. With the highest poverty rate and a quarter of the working age population working abroad, the country as a whole and its vulnerable population in particular are highly dependent on remittances, with USD 1.91 billion remitted in 2019 (nearly 16 percent of GDP) placing Moldova among the top 20 most remittance-dependent countries in the world (World Bank, 2018a). Levels of consumption, including consumption of food and food products, are directly correlated with the amount of remittances reaching the country. When the global economy is bad or other external shocks, such as the COVID-19 pandemic, take effect, the impact of such events on economies heavily dependent on remittances is serious. For instance, the pandemic provoked a fall in remittances from Moldovans working abroad of 25 percent. Given that remittances account for around 25 percent of the total income of Moldovan households, especially in rural areas (IOM, 2019), such trends result in lower spending among the population on food and food products.

Moldova continues to be a predominantly rural country. The share of the population living in cities is only 43 percent and has not changed significantly over the years (World Bank, 2020b). Street food is an inexpensive source of nourishment typical of urban areas and is highly diverse and a widely available, while often being high in calories, energy dense, and rich in fats, sugar and sodium. Its widespread consumption results in decreased intake of fibre-rich foods such as legumes, fruit, vegetables and whole grains. The outcomes of such a diet are associated with increased rates of weight gain and occurrence of noncommunicable diseases.[5]

[5] www.euro.who.int/__data/assets/pdf_file/0006/371139/feed-moldova-rus.pdf

Chapter 3. The core components of food systems

3.1. Food supply chains

Food production system. According to FAOSTAT, agricultural land occupies 69 percent of the total area of Moldova (FAO, 2019a) of which 74.7 percent is arable land (FAO, 2019b). About 10.25 percent of all agricultural land is under permanent crops (FAO, 2019o) and 73.3 percent is under temporary crops (FAO, 2019p). However, over the past ten years the total area of agricultural land and arable land, and especially, the area under permanent crops, have decreased. While the area of land equipped for irrigation has not changed (FAO, 2019q), the actual area irrigated has decreased by 5 700 ha or 0.3 percent over the past five years (FAO, 2018c). This is indicative of more intensive land use which has a negative impact on soil fertility. Intensive land development and ploughing intensify water erosion processes, and irrigation causes secondary soil salinization.

The insufficient application of organic fertilizers which does not compensate for the loss of organic matter leads to dehumification, while the irrational use of pesticides results in soil pollution. Data show that the use of fertilizers has increased 2.6 times over ten years (World Bank, 2020j), suggesting that natural soil resources are inadequate for intended production volumes. At the same time, pesticides use increased 1.36 times (FAO, 2018d) and synthetic fertilizers 4.4 times (FAO, 2018e). Excessive application of synthetic fertilizers causes soil acidification, and haphazard grazing of livestock leads to the destruction of vegetation, intensification of water and wind erosion, and contamination of soils and reservoirs with manure. To minimize these processes, it is necessary to introduce crop rotation including perennial grasses, apply organic fertilizers and optimize soil processing systems.

In order to maintain the quality and production capacity of soils over the long term and thereby ensure national food security, the Government of Moldova, through the Ministry of Agriculture, Regional Development and Environment (MARDE), has implemented the “Programme for the Conservation and Improvement of Soil Fertility 2011–2020”. The results, once publicly available, will shed light on how Moldova has progressed in achieving these goals.

Input supply. Agricultural production in Moldova is entirely dependent on imports of plant protection products, fertilizers, seeds and fuels, which has a negative impact on the competitiveness of Moldovan agricultural and food products. Since both fuel and plant protection products and fertilizers are imported, Moldovan agriculture is exposed to international price volatility. Accordingly, since most traded agricultural inputs are imported, Moldovan farmers must pay global prices for them, but are unable to benefit from global prices for their products to the same extent.

Production and yield. Over the past ten years, the proportion of areas harvested with main **cereals** has altered considerably, with a decrease of 65.3 percent in areas planted with barley. At the same time, the proportion of areas under maize has increased by 24.7 percent and wheat by + 0.3 percent (FAO, 2019t).

Statistics show that in 2019 production of barley was 35.7 percent lower than ten years ago, while maize was higher by 86.7 percent and wheat by 55.1 percent (FAO, 2019r). In general, grain production has increased 61.1 percent.

Since the growth in production volumes was accompanied by a reduction in acreage, the yield of the three grains has increased by more than 50 percent for each crop (FAO, 2019s). This was facilitated mainly by the increased use of fertilizers.

Open field **vegetables** consist mainly of dry onions, tomatoes, different kinds of cabbage, pumpkins, cucumbers and green peas. In Moldova, fewer and fewer field vegetables are being grown: the total area shrank from 41 150 ha in 2009 to only 29 400 ha in 2019 (FAO, 2019t). Meanwhile, greenhouse production has become more widespread in recent years with total production amounting to approximately 54 000 tonnes of vegetables. Tomatoes account for 77 percent, cucumbers for 9 percent, sweet peppers for 3 percent and other crops such as cabbage and radishes for 11 percent.[6]

Though the primary vegetable yield in Moldova has fluctuated substantially in recent years, an overall increasing trend emerged during 2009–2019 (FAO, 2019s). Due to fluctuations in weather conditions and other factors, yields increased from a record low in 2012 of 70.76 tonnes per ha to a record high in 2017 of 102.435 tonnes per ha. In 2019, the primary vegetable yield was 80.41 tonnes per ha.

In general, the production techniques currently used for vegetables in Moldova result in low quality, low yield per ha, and (apart from tomatoes) country-wise limited volumes, with open-field production (and limited use of greenhouses) producing yields that are often unsuitable for sale to supermarkets, due to the desire for vegetables of uniform appearance and size. Most of these vegetables are therefore sold at open-air markets and to the processing industry. The bulk of tomatoes, the principal vegetable crop, are processed but yields are relatively low here as well, with almost no vegetables exported. Traders have little export experience in these commodities, and cold storage, proper handling and packaging are limited.

Moldova is a major producer and exporter of **fruits**, notably apples, apricots, peaches, cherries, quinces and plums. Fruit-growing areas have increased significantly, especially for apricots (1.7 fold), cherries

[6] USAID: End Market Study (II) for fresh F&V in Moldova; ACED II; 2019. https://pdf.usaid.gov/pdf_docs/PA00KZV7.pdf

(1.8 fold) and quince (twofold). An exception to the trend is apple cultivation, with the area harvested decreasing by 10 percent over ten years (FAO, 2019t). However, gross production increased 2.9 times and yields also increased 3.3 times (FAO, 2019s). Since reliance on weather conditions for gardening is ineffective, apple growers are developing intensive cultivation in orchards equipped with irrigation, anti-freeze and anti-hail systems, which enable higher yields. Quince yields, on the contrary, show a decline due to the development of new orchards that have not yet borne fruit on a large scale. The quince plantation area peaked in 2017, after which there has been an annual decline (2018–2019), indicating that not all startups were successful. The traditional market for Moldovan fruits is CIS countries (Belarus, Kazakhstan, the Russian Federation and Ukraine) as well as some European countries – Czech Republic, Poland, Romania and others.

The European Union is helping Moldova to develop fruit production. In 2018–2019, the EU4Business project "Orchard of Moldova" saw funding allocated to banks in Moldova to lend to fruit producers, while EU experts offered technical assistance.

In addition to cereals and fruits and vegetables, Moldova is a producer and supplier of other types of agricultural crops such as beans, sunflowers, soybeans, melons and nuts. **Walnut growing** in Moldova is an industry that generates revenues comparable to revenues from wine exports at approximately, USD 100 million per year. Moldova is the largest exporter of walnuts in Europe and is among the top 10 in the world (UNCTAD, 2018). For the past ten years, the walnut-harvested area has increased 5.5 times, due to new walnut plantation development, and production volume has increased 1.8 times (NBS, 2019). The yield, which is the ratio of the two indicators, shows a decrease, however, due to weather condition fluctuations – to which the walnut is very sensitive, the spread of diseases, lack of necessary concentrations of potassium and boron in the soil, and the development of new plantations which have not yet reached the harvest period.

Winemaking is a long-standing tradition of Moldovans. Wines of Moldova are known in the CIS and are acquiring increased visibility in the European Union and beyond. Over the last ten years, however, vineyard areas have decreased by 12.5 percent (FAO, 2019t), grape production shrank by 9.8 percent (FAO, 2019r) and yield by 3.5 percent (FAO, 2019s). The main reasons underlying this trend are the low quality of domestic wines and the imbalance between the supply of local producers and demand in foreign markets. To address these problems, the programme "Wine of Moldova – 2030" was launched to add value to the industry.

The **livestock sector** did not successfully manage the transition from the centrally planned to the free market economy. During the Soviet era, animal production was concentrated in large farms which have since been privatized. After the animals were distributed to the local population, many were slaughtered by rural households as sufficient fodder and stables were not available. Today, after 30 years, the majority of smallholders do not possess adequate knowledge about raising cattle, whether for milk or meat production. ACSA, the responsible extension service provider, is not very active on cattle

farms and skills in animal husbandry, fodder production, nutrition, farm management and cost-counting are not well developed.

In addition, access to finance is limited, due especially to lack of collateral among most actors. In cases where sufficient collateral is available, interest rates are usually too high and the grace period is often too short.

Over the last ten years, the number of cattle has decreased by 20 percent, goats by 10 percent, and sheep and pigs by 10 percent (FAO, 2019r). Livestock farming in Moldova is still extensive (i.e. most of the livestock is kept in private farmsteads), but livestock farms are underdeveloped. In this regard, manufacturers' response to weather changes or external economic risks remains situational.

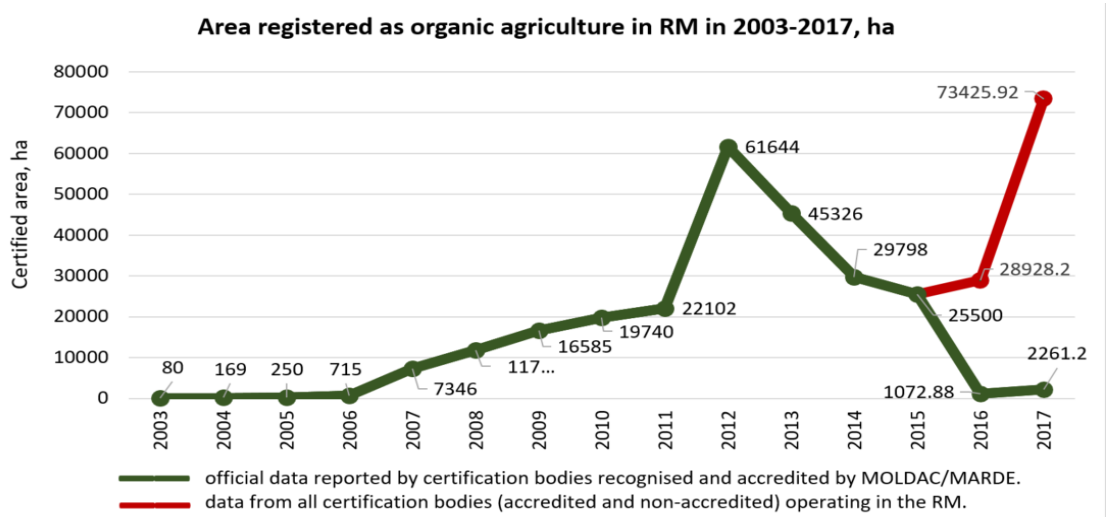
Moldovan meat producers do not supply enough products to satisfy domestic consumption demand.

Organic agriculture. In 2015, the world agreed on the 2030 Agenda for Sustainable Development, including 17 UN Sustainable Development Goals (SDGs), and the green economy and sustainable food systems approach gained increasing attention and momentum worldwide. Countries that rely on agriculture to a significant extent are considering prioritizing a shift towards ecological agriculture. This process is reflected in most of Moldova's framework documents, starting with the National Development Strategy (NDS) Moldova 2030. The Green Economy package, adopted by the Government of Moldova in February 2018, and the National Strategy on Agriculture and Rural Development of Moldova 2014–2020, also recognize the urgent importance of developing organic agriculture and ensuring more added value. Against this backdrop, the demand for organic products has increased globally every year (Willer *et al.*, 2020), with consumers ready to pay more than usual to be confident in the safety and nutritious value of the product. Moldova recognizes this global trend and has tried to adapt accordingly in order to create the conditions necessary to tackle problems related to conventional agriculture, as well as to increase both domestic consumption and exports of organic products.

Despite an existing legal base for organic agriculture in Moldova, as well as incentives for organic farmers in the form of state subsidies first provided in 2007, the government has not been able to properly adapt and harmonize national legislation to the EU legal framework on organic agriculture. At present, there remains a large gap between current EU legislation and the Moldovan legal framework, with MARDE reporting a 40 percent level of harmonization in 2017. The Government of Moldova has been unable to adjust its monitoring functions resulting in failure to achieve an equivalence arrangement with the European Union. This means that organic entrepreneurs in Moldova must obtain two forms of certification – one from an EU accredited control body to enable their products to be accepted on the EU market and one from a Moldova accredited control body to benefit from Moldovan organic subsidies. According to MARDE, as of 2017, nearly 76 000 ha are certified as organic, representing 3.9 percent of the total agricultural land currently in use. Out of these, 2 261.2 ha

(3 percent) are certified by national certifying bodies and 73 424.92 ha (97 percent) are under international certification.

Figure 2. Area registered as organic agriculture in the Republic of Moldova



Source: MARDE (2017).

Information from MARDE also indicate that organic farmland consists of 77 percent arable crops, 20 percent tree crops, and 3 percent medicinal and aromatic plants. The most common organic products produced in the country in terms of volume are:

- sunflower seed, maize, wheat, soybean, peas, rape seed and barley (arable crops);
- shelled walnuts and dried plums (tree crops);
- lavender, coriander seed and sage (medicinal and aromatic plant).

While no official data are available on the share of each crop, consultations with stakeholders and organic producers revealed that since 2009, the land cultivated with organic cereals (wheat, maize and barley) accounts for approximately two-thirds of all organic land area, equivalent to nearly 50 000 ha.

Storage for crops. According to data from the National Bureau of Statistics (NBS) and information collected during interviews with the Moldova Organic Value Chain Alliance (MOVCA) and other producers and storage facility operators, the rate of capacity versus utilization is more than 100 percent across all storage facilities (sheds, barns for grain, space for refrigeration, cold storage and other storage). In other words, farmers have insufficient space for storage. Space for refrigeration and cold storage, which is especially important for vegetables and fruits, is being stretched to critical capacity. Freshness is a crucial factor for the value of fruit and vegetables, and this lack of refrigeration space and

cold storage constitutes a significant obstacle to adding value to crops, while contributing to post-harvest loses and, potentially, crop safety.

Certain product losses are inevitable during storage and distribution. This is true for both short supply chains and exports. According to FAOSTAT (FAO, 2019u), over the past ten years cereal crop losses in Moldova fluctuated annually within 6–8 percent of total production, increasing in more productive years (2013, 2014). Losses of fruit crops for the same period were in the range of 5–13 percent of total production, while losses of pulse crops amounted to 3–9 percent, having increased in recent years, and losses of vegetables were at 6.5–8 percent.

Storage and the timely sale of agricultural products depend directly on transportation and logistical services. Road infrastructure and electrification play key roles in this area, especially in the countryside. According to the World Bank, access to electricity in rural Moldova is now 100 percent, as of 2009 (World Bank, 2020e). However, assessment of road quality by the World Economic Forum index 2019 (The Global Economy, 2021b) found the quality of roads in Moldova to be among the worst in the world (127th out of 141), although the index also reflected a recent upward trend in road quality infrastructure development, linked to international development donor support.

Distribution. Transporters collect crops from villages where large storage or cold storage facilities are present. Small and medium-size trucks, sometimes owned by farmers, collect crops from farm gates and transport them to wholesale markets, carrying the crops of neighbouring farmers as well as their own.

Medium and large-size farm holders usually maintain their own warehouses for agricultural crops. They establish warehouses for their own crops, and rent space to other farmers in order to collect service fees for operation.

According to Dumitru Albulesa, Chairman of the Transporters Union of Moldova (TUM), roads are the most important means of transportation, with approximately 6 000 trucks (3 000 equipped with cold storage facilities) being operated in Moldova. However, 70 percent of drivers work abroad due to the small size of loads for domestic distribution. Conversely, many workers transporting shipments for other countries pass through Moldova. This pattern ensures a sufficient number of cold trucks to meet domestic demand.

Moldova is also a country with sufficiently developed railway capabilities. Railway coverage is 3.4 km per 100 km^2 area, much higher than in Eastern Europe (0. 9 km) (FAO, 2018f). Rail transportation is not common for agricultural products, but agricultural inputs such as chemicals and fertilizers are transported by train. There is only one river port, Giurgiulesti, from where agri-food items are exported via marine transport through the Black Sea to countries in Central and South Asia.

To ensure further economic development, Moldova needs an efficient transport system capable of meeting the needs of the population in terms of mobility and facilitating trade development in domestic and foreign markets, whilst simultaneously being attractive and affordable for investment.

Agri-food processing industry. Companies that process domestic and international agricultural raw materials into food are rare in Moldova. Large-scale processors may not be able to secure considerable quantities of domestic raw produce due to lack of capacity among farmers to produce sufficient volumes, which fosters dependency on imports. However, small-scale processors are usually able to procure raw materials locally. Suppliers of raw materials are usually small to medium-size farmers cultivating produce in the areas around the factories. While there is no contractual relationship between processor and farmers, they do depend on informal networking within communities.

In 2011, there were 1 342 enterprises in the agri-food sector employing 26 700 persons. The number of enterprises has since decreased to 1 079 in 2017 (NBS, 2019). Assuming a linear decrease in employment, there should have been 22 788 persons employed in 2017. However, the available data are insufficient as usually only 5 percent of employees in agri-food are permanent employees, with temporary or seasonal workers, employed primarily during the harvest season, making up the overwhelming majority.

The large-scale food processing industry which originated from the centrally planned state economy is characterized by underutilization of capacities and insufficient investment. In general, high levels of moral and physical depreciation of industrial capacities and infrastructure are typical among local food processing companies, with processing equipment and technologies not energy efficient and failing to meet modern standards (Kintsurashvili and Kresic, 2017). Many enterprises also lack modern management practices and the necessary investment and working capital.

Such lack of financial resources has led to inadequate compensation and has contributed to the outward flow of skilled labour. Also missing is working capital. This constitutes a major threat as agricultural raw materials must be purchased on a cash-against-goods basis which renders processors unable to procure all necessary raw materials due to financial limitations.

The lack of horizontal and vertical coordination of supply chains has placed constraints on the growth of the agri-food industry, resulting in low levels of international competitiveness for the sector overall. Additional depressing factors are driving down the prices of agricultural products. These include poor development of wholesale markets, low bargaining power, inconsistent product quality, insufficient distribution channels, poor infrastructure and limited access to foreign markets. Value chain deficiencies lead to large discrepancies between the farm gate price and the consumer price, which in turn results in low-income, low investment and persistently low-quality products at the farm level.

Packaging. It is difficult to assess the development of the packaging sector due to the lack of relevant data for Moldova in international databases. Fragmentary data from FAOSTAT indicate export quantities for 2009–2011, which considerably exceed imports. In turn, import quantities have almost doubled over the last ten years.

Typically, paper food packaging is used for flour, sugar, salt, starch, coffee, tea, cereals, baked goods, hot bread, confectionery and other food products. Paper packaging has also gained considerable popularity among fast food and fast-food restaurants of late. The development of the domestic paper packaging sector could be an alternative to imports and could also help combat single use plastic packaging.

Enterprises specialized in packaging are rare in the country. Companies packaging fresh agricultural products and processed agri-food are also in short supply. National level agri-food products are not well packed, instead being packaged in simple wooden boxes manufactured outside of Moldova. Packaged fresh products are usually destined for export.

Retail and marketing. According to FAOSTAT, the concentration of modern grocery retailers and supermarkets in Moldova today is higher than the world average but lower than in Eastern Europe (FSD, 2020). This trend is due mainly to the habits of older generation who continue to buy food from open-air food markets based on perceptions of lower prices and better quality . The COVID-19 pandemic, however, has shifter preferences among the population towards modern retail stores and supermarkets. This trend is likely to continue.

The urban population of Moldova is concentrated around the capital city, Chisinau, the second largest city, Balti (northern Moldova) and Kahul (southern Moldova). There are only two wholesale markets in Chisinau and one in Balti. In terms of retail, there are three general types of retail establishment:

- ***Public markets*** are traditional food markets located in open air or indoor spaces that offer a large variety of fresh food, including fruits and vegetables, milk and dairy products, meat, fish, bread and pastry, and non-food product categories. Each neighbourhood (rayon) in all cities has a public market administrated by the local authorities where people can buy fresh and preserved food (fruits, vegetables, seeds, meat, fish, sweets and fast-food).

- ***Street-side sellers*** offer a wide range of products including fruit, vegetables, home-made conserved foods and flowers. Although this type of activity is illegal by law, street sellers operate in the proximity of public markets, selling products at competitive prices, and attract many customers. The hygiene and food safety of products sold by street sellers is a concern for the

relevant public authorities, and while the practice is common, it is likely to be discontinued in the near future following expected changes in legislation and associated law enforcement actions.

- ***Supermarkets, minimarkets/convenience shops***. The last two decades have seen a significant structural shift in the food retailing sector. Traditionally dominated by small outlets, the sector has seen strong growth of supermarket chains, with eight food retail chains currently operating more than 150 supermarkets of different sizes in Moldova. Altogether, they account for a quarter of total grocery retail food turnover in the country. Most supermarkets are located in Chisinau, Balti and Kahul, but further expansion beyond these three cities is expected in the near future.

Despite amendments in 2018 to the Law on internal trade, according to which at least 50 percent of fresh agricultural produce on store shelves should be of Moldovan origin, less than an estimated 5–12 percent (depending on seasonality) of domestically produced fresh fruit and vegetables is sold through supermarket chains. This situation is due mainly to the inability of Moldovan producers and distributors to meet supermarkets' requirements, both in terms of quality and quantity of fresh agricultural products.

During the recent pandemic, customers began to turn to organized retail for food and health safety reasons. According to several NGOs dealing with food systems development in Moldova, who were interviewed for the project, the average Moldovan consumer believes that supermarkets preserve the quality of fresh food and agro produce much better than traditional market operators. Another important factor in favour of supermarkets is the higher level of service provided.

3.2. Food environments

Food environments are defined as "the physical, economic, political and socio-cultural context in which consumers engage with the food system to make their decisions about acquiring, preparing and consuming food" (HLPE, 2017). These environments represent the interface between consumers and other parts of the food system, and constitute the space where physical infrastructure, individual preferences and market conditions interact and shape each other.

3.2.1. Food availability

Since the mid-1990s, food availability has ceased to be an issue at the country level. Moreover, increasing agro-food imports suggest a fast-growing consumer market in Moldova that presents both

opportunities and challenges to domestic agro-food producers. At the same time, this trend could create problems for rural households when adverse climatic conditions affect their own production, as high volatility of output is an issue in rural areas.

The average dietary energy in food supply in Moldova is 2 357 kcal per person (FAO, 2019v), a figure that has not changed significantly over the past ten years. The value of this indicator is lower than in other Eastern European countries, but is within WHO norms. Average protein supply (g/cap/day, three-year average) (FAO, 2017a) is 62.7 g per day, of which average protein supply of animal origin (g/cap/day, three-year average) (FAO, 2017b) is 29.7 g, considerably lower than in other Eastern European countries (96.4 g and 50.1 g, respectively) and slightly lower than the global average (79.9 g and 31.3 g, respectively). For the past ten years, average protein supply in Moldova has decreased by 10 percent, while the share of dietary energy from cereals, roots and tubers fluctuates between 44 percent and 47 percent, and has increased slightly every year since 2009 (FAO, 2017c).

Regarding other food products, the increase in the supply of meat (19.7 percent) and fruits (69.6 percent) over the same period is noteworthy, as is the decline in the supply of eggs (10.6 percent), vegetables (28.8 percent), fish (15.3 percent), milk (31.6 percent) and pulses (32.2 percent) (FSD, 2009–2017).

According to FAOSTAT, per capita food supply variability decreased by 24.4 percent over eight years during the period 2010–2017 (FAO, 2017e), while per capita food production variability (in constant 2004–2006 thousand in USD per capita, FAO, 2015b) decreased by 21.3 percent over six years during the period 2010–2015 (FAO, 2017d).

As of 2017, the percentage of the population using at least basic drinking water services in Moldova was 90.6 percent, 4.6 percent higher than in 2010 (FAO, 2017f), whereas the percentage of the population using safely managed drinking water services was 74.1 percent (FAO, 2017g) representing an increase of 19.1 percent over the same period. The percentage of the population using at least basic sanitation services was 78.7 percent (FAO, 2017h), a 4.23 percent increase compared to 2010, and comparable to the world average.

3.2.2. Food affordability and physical access

In 2019, Moldova ranked last among Black Sea countries in household consumption expenditure per capita per year, although at USD 5 852 the indicator value was twice that of 2009 (World Bank, 2019b).

Median income per person per day in Moldova was 8.25 international dollars (2011 PPP) in 2013 (FAO, 2013). However, due to the lack of relevant data in FAO statistics (World Bank, 2021d), it is impossible to analyse the dynamics of household income, although it is possible to estimate final consumption expenditure per capita, which to date has increased 1.65 times.

The percentage of individuals (aged 15+ years) without access to emergency funds, among the poorest 40 percent, according to USAID (2017), decreased from 42.76 percent in 2014 to 32.36 percent in 2017. According to the World Bank (2017a), 17.02 percent of the population own a personal credit card, a figure nine times higher than in 2011. The transition to cashless payments is progressing at a rate similar to that of other developing countries of Europe. Meanwhile, personal remittances received per capita have doubled over the last ten years.

The motorization rate (vehicles per 1 000 inhabitants) indicates that less than one-fifth of the country's population has personal transport (UNECE, 2018). In comparison with other European countries, Moldova has one of the lowest car ownership rates, alongside Albania and Azerbaijan.

Food prices in Moldova have grown steadily over the last decade, but at a slower pace and with less volatility than global food prices (World Bank, 2020i). In addition, the global food price shocks of the last decade, especially in 2010 and 2015, impacted the country to a lesser degree than the rest of the world, due to strong local supplies of agricultural and food products, which smoothed the effects of global price swells on domestic food markets.

According to FAOSTAT, producer prices for some basic agricultural products have even decreased over the past decade. Producer prices for barley (USD/tonne) decreased by 15.2 percent, maize by 5.2 percent (2013–2019) and wheat by 2.6 percent (2013–2019). Among other protein products, producer prices for eggs decreased by 16.2 percent (FAO, 2019w).

3.2.3. Promotion, advertising and information

Low- and middle-income countries are undergoing dietary changes, characterized by increased consumption of processed foods coupled with decreased consumption of fresh food. This has serious health implications, as packaged and processed foods tend to be less nutritious, higher in calories and associated with lower quality diets, increased obesity and increased disease.

Packaged food retail trade per capita is a measure that quantifies the average volume of packaged food sold in markets, including supermarkets, food markets, convenience stores and online shopping, per capita. The retail value of packaged food sales per capita (FSD, 2017) is USD 269.7 per capita, which is

USD 45 higher than the level in 2016. Although the current value is 21.3 percent lower than the world average and 52 percent lower than the Eastern European average, this trend suggests that the population of Moldova has begun to buy more packaged products.

The retail value of ultra-processed food sales per capita (FSD, 2018) shows a similar trend. The consumption of highly processed foods high in fat, salt and glycaemic load is growing worldwide, and Moldova is no exception. This is an alarming trend in health terms.

3.2.4 Food quality and safety

In 2005, the Moldovan government and the European Union agreed an action plan for the promotion of efficient policy harmonization aimed at future integration. Since then, the Moldovan government has undertaken actions to adopt legislation related to agriculture and food safety in conformity with European laws. As part of this legislative transition, Moldova's food standards and regulations will mostly align themselves with European food hygiene requirements. According to the National Food Safety Agency (NFSA), as of 2019, around 830 European (CEN) and international (ISO) standards have been adopted by the Moldovan food sector, of which 523 are CEN standards. At the governmental policy level, harmonization of food safety regulation is advancing steadily. However, at the field level, actors such as farmers and food industries tend to follow previous GOST standards due to their familiarity. Awareness-building activities for food business operators conducted through audits by NFSA subdivision staff is therefore necessary to advance the implementation of the new standards.

3.3. Consumer behaviour

For most people in Moldova, price remains the main driver of consumer behaviour. In addition, people like the convenience offered by modern retail outlets of having multiple products under one roof. At the same time, urban consumers with higher incomes have become more interested in niche products that they perceive as exclusive or healthy, but are also increasingly aware of environmental and ethical considerations related to supply chains. Product properties as well as packaging are very important to these consumers, who are very well informed, read food labels attentively, like to experiment and demand new methods of payment. Large companies usually immediately adapt to such consumer demand, for example, by reformulating their products to contain less fats or sugars.

Regarding food consumption location, eating out has gained in popularity among the population over the past decade, although most Moldovans still prefer to consume traditionally prepared home-made food in their households.

Short supply chains. Direct selling of agriculture produce, especially fresh fruits and vegetables, from producer to consumers is a traditional transaction channel in Moldova. In recent years, it has been facilitated by dedicated online platforms and delivery services. Small operators often lack a shop or website but might have a social media page through which they organize distribution. In some urban areas there has been a proliferation of subscription-based farmer-producer partnerships, where food baskets with fresh products are delivered weekly. Despite the relative interest in such initiatives, these efforts remain localized and specific to the larger (and economically wealthier) urban centres. Stark differences exist across regions depending on socio-demographic and geographical factors, and the majority of the population remains rather disconnected from learning about or experiencing the benefits of such developments. In deep rural areas of the country (away from regional centres), the penetration of modern retail stores (supermarkets) remains limited, despite some growth in recent years, with traditional markets still playing a very important role in the supply of food. In such cases, trust in specific producers is very important, as there is a high degree of loyalty among customers.

3.4. Diets

Over the past decades, many Eastern European countries have seen shifts in nutritional and dietary patterns, based mainly on increased supply of processed foods linked to fast-spreading globalization and urbanization processes. Moldova is not an exception. The changing dietary habits of the population could bring about positive or negative long-term health effects, affecting in particular the health of the younger generation. In general, associated dietary changes include reduced consumption of fibre-rich foods such as legumes, fruits, vegetables and whole grains, and increased consumption of processed foods, which are often high in calories, fat, sugar and salt.

Consumption of basic products such as cereals has not undergone significant changes over the past ten years. The share of dietary energy supply derived from cereals, roots and tubers (three-year average) was 45 percent in 2019 having increased by 2.27 percent compared to 2009 (FAO, 2019ah).

According to the NBS, the average Moldovan consumes 119.3 kg of bakery products, 54.3 kg of meat and meat products (below EU standards), 245.5 litres of milk and dairy products, 11.8 litres of vegetable oil, 19.7 kg of fish and fish products, 121.1 kg of vegetables, 43.1 kg of potatoes, and 68.8 kg of fruit and berries per year. Over the period available for analysis (2014–2020), the consumption of vegetable oil decreased by 3.3 percent and potatoes by 4.2 percent. At the same time, the dynamics of consumption of other products was positive, with the highest growth demonstrated by the “fruit and berries” category at 51.2 percent over seven years (NBS, 2019). This increase is related mainly to increased awareness among the population of the positive effects of fruits and berries on human health, and the increased demand and supply of these products by domestic producers.

As of 2020, more than 30 countries in Europe have national dietary guidelines in place for the public, and some of these have developed paediatric guidelines and educational materials for different age groups. Moldova is not one of these countries; however, for several years, from 2014 to 2020, the country implemented a national nutrition and dietary programme (although the results are not yet in the public domain). Social awareness programmes related to the benefits of daily consumption of fruits and vegetables to human health and the need to decrease the consumption of sugar and salt are common in Moldova, with mainstream TV and radio channels used for this purpose.

it is noteworthy that cardiovascular disease (CVD) and cancer mortality rates in Eastern Europe are among the highest in the world. Some research has concluded that, although diet is an important risk factor, traditional eating habits in this region may contribute to poor health status, especially the high CVD mortality rates of populations in Moldova and other Eastern European countries (Stefler *et al*., 2021). In particular, the very high levels of alcohol consumption are considered a primary cause of poor health, and adequate public health nutritional interventions in this region are essential. Awareness-raising and public campaigns on this issue are already being implemented.

A National Programme for the Elimination of Iodine Deficiency Disorders was in operation in Moldova from 2011 to 2015. The programme aimed to increase the usage of adequately iodized salt to at least 90 percent by domestic agri and food producers.

Finally, demand for and consumption of organic agricultural products is on the rise in Moldova. While still a niche market, with the support and promotion of MOVCA and a number of non-governmental organizations (NGOs), including ECO-VISIO, KATALIST, CLIMBIZ and others, it is expected to grow steadily as general awareness of the benefits of organic agriculture products increases alongside projected growth in the disposable income of Moldovans.

Chapter 4. Food system outcomes

4.1. Nutrition and health outcomes

Malnutrition levels among the Moldovan population are relatively low across all categories – stunting, wasting and underweight (FAO, IFAD, UNICEF, WFP and WHO, 2020). Food insecurity is not a major challenge for the country but can still be felt in low-income households, especially when high production and price volatility affect food availability and access. Overall, food insecurity is highest during the off-season (January-June) and increases with household size. Most food-insecure households are headed by men and located in vulnerable urban areas (FAO, 2019ah).

Food security indicators show negative dynamics. Prevalence of moderate to severe food insecurity in the total population (three-year average, 2018–2020) is 27.2 percent (FAO, 2020a), representing a slight decrease compared to 2014–2016. However, the indicator is higher than the averages for Eastern Europe and the world. Prevalence of severe food insecurity in the total population (three-year average, 2018–2020) is 4.5 percent, nearly three times higher than in 2014–2016 and four times higher than the average for Eastern Europe (1.1 percent) (FAO, 2020b).

In Moldova, 36.4 percent of mothers feed their babies with breastmilk, slightly below the world average of 37 percent (FAO, 2012). Some 5 percent of babies have a low birth weight (FAO, 2015c), a figure that is slowly but steadily decreasing. The percentage of children under 5 years of age who are stunted (FAO, 2020c) is 4.9 percent, 37 percent lower than the base year of 2009. The share of children with overweight (FAO, 2020d) is similarly declining (from 6.9 percent in 2009 to 4.3 percent in 2020). For children under the age of 5 years, it can be concluded that provision of nutrients is improving.

Obesity is also indicative of nutritional imbalances and public health problems. Among the adult population, the prevalence of obesity in the adult population (18 years and older) is higher than the world average, but lower than in Eastern Europe (FAO, 2016). In Moldova, the indicator increased from 16.9 percent in 2010 to 18.9 percent in 2016.

According to WHO, the principal causes of death among the population are cardiovascular diseases (59 percent), followed by cancer (14 percent) and other NCDs (12 percent). The NCD mortality rate is decreasing overall, including the percentage of NCD deaths that are premature. In recent years, the number of women of reproductive age (15–49 years) suffering from anaemia has increased. Diabetes accounts for 1 percent of mortality rates, but the incidence rate is much higher: one in eight (12.3 percent of the population) suffers from diabetes or low glucose tolerance according to a 2014 survey that targeted overweight women with obesity and/or low physical activity (WHO, 2018).

In December 2020, Moldova joined the FAO-Türkiye Food and Agriculture Partnership Programme I and began working together with Azerbaijan and Türkiye to improve national food safety systems and develop regional cooperation.

4.2. Socio-economic outcomes

Moldova is the poorest European country by GDP per capita with nearly 20 percent of its roughly 3.5 million population living below the poverty line (NBS, 2019). While high, this level represents an improvement on the 70 percent poverty rate in 2000.

Currently, in the Republic of Moldova, indicators of economic activity and the level of employment are extremely low for all age groups, but especially among young people (World Bank, 2021c). Employment in the agricultural sector is plummeting due to massive emigration. In 2009, there were 333.7 people (of which 50 percent were women) working in the agricultural sector per 1 000 accounting for just over 28 percent of total employment in the country. In 2019, this figure had almost halved at 182.5 per 1 000 people (FAO, 2019x). A combination of lack of quality jobs, low labour productivity and income levels, economic development trends unfavourable to rural areas and insignificant institutional capacity have led to an increase in poverty and increased social exclusion, and have created conditions for external labour migration (especially from rural areas) as an alternative to unemployment and informal employment. Poverty in the country, especially in rural areas, has not been eradicated, as evidenced by the GINI index, which however shows some improvement in recent years.

In terms of **gender equality**, Moldova ranks 46th in the world according to the Gender Inequality Index, and is therefore classified as a country that has not yet attained gender equality (UNDP, 2020). The Global Gender Gap Index ranks Moldova 5th among the countries of Eastern Europe and Central Asia and 28th in the world (World Economic Forum, 2022). This is an alarming result, especially since in both 2006 and 2020 Moldova ranked 1st in the world in terms of inequality in the Health and Survival category.

According to World Bank data, at the end of 2019, GDP per capita in Moldova remained the lowest in Europe. The global financial and economic crisis of 2009, as well as the prolonged national political crises of 2012 and 2015, had a significant negative impact on national economic growth, including in the agro-food sector. It should be noted, however, that periods of intensive economic growth in Moldova are always closely related to the remittances of migrants. Growth in consumption is due largely to increasing volumes of official remittances o from abroad, mainly from the European Union or the Russian Federation.

Agriculture is one of the main drivers of the national economy. Since the collapse of the Soviet Union when Moldova's share of agriculture in GDP accounted for just over 35 percent, a sharp yearly decline in the sector's added value saw the same share fall to 8.5 percent in 2009. Since then, a slow but steady increase was observed reaching 12.22 percent in 2014, but afterwards declining again to 9.6 percent of the country's GDP in 2019 (FAO, 2019i).

Approximately 70 percent of the population from rural areas depends on agriculture for their livelihoods. Agro-food exports account for roughly 50 percent of total exports. This number has remained almost the same over the past decade with some fluctuations. The leading agricultural unprocessed export commodities are walnuts, apples, wheat, maize and barley. Imports of wheat (flour), meat, dairy and vegetables (tomatoes) used for both human and animal consumption are meant to compensate for the agricultural production deficit.

Because of the dominant role that agriculture plays in the economic structure of the country, the relative vulnerability of the Moldovan economy is determined by the development of the agro-food sector. Furthermore, the seasonal nature of agricultural work, frequent natural disasters (droughts, frosts and floods) and the unprofitability of the industry, means that the country cannot ensure economic growth based almost solely on agriculture.

Due to the peculiarities of the structure of industrial production, Moldova is a country with an extremely high dependence on food production. Moreover, Moldova has a **very low level of agriculture productivity** and **incomes**. Despite an overall positive trend in labour productivity over the past decade from USD 2.703 in 2009 to USD 6.268 in 2019 (constant 2010 USD), this level remains 3.5 times below the average for Europe (World Bank, 2019a). This indicates the presence of considerable barriers to improving productivity in the agricultural sector and strong economic dependence on external conditions. **Average monthly earnings per month are USD 165**.

In the global Doing Business ranking, which assesses the level of favourable legal norms for entrepreneurial activity, Moldova ranked 48th among 190 countries at the end of 2020, indicating progress since 2009 (Doing Business Index, 2020). It is relatively easy to start a business in Moldova (13th place) and the cost of registration is 4 percent of income per capita. Moldova also ranks high in terms of ease of registering property (22nd place), and 38th in the world in terms of ease of engaging in international trade.

4.3. Environmental outcomes

Greenhouse gas emissions in Moldova average 10.8 metric tonnes of CO_2 equivalent (Mt CO2 eq), much lower than the average for Eastern Europe. Approximately 71.7 percent of the country's emissions are

attributed to the energy sector, while agriculture, waste management and industrial processes contribute 11.6 percent, 11.5 percent and 4.9 percent, respectively (WRI, 2020). Most agricultural emissions come from livestock production.

Thanks to its fertile soil and temperate climate, the Republic of Moldova has a competitive advantage in agricultural production. At the same time, the agricultural sector itself is a source of negative impact on the environment. According to the EPI, climate change in Moldova is assessed as negative (score 52.2, ten-year change -14.4, 87th place).

Biodiversity. According to the EPI, ecosystem vitality has undergone a number of negative changes over the last decade (score 43.6, ten-year change -9.3, 99th place). In particular, according to the Biodiversity indicator, Moldova ranks 160 out of 180 countries in the world, indicating that the country's actions to preserve natural ecosystems and protect the entire spectrum of biodiversity are insufficient, in particular those targeted at protecting the habitat (Species Habitat Index, score 2.5, ten-year change, 105th place; Biodiversity Habitat Index, score 40.2, ten-year change -1.7, 164th place). Due to the intensity of agriculture, notable pressures from grazing, erosion and salinization of soils, and the use of fertilizers, the ecological integrity of the steppe habitat is under threat. This means fewer suitable habitats for endemic and rare species, and risks of population loss or extinction.

Significant improvements have not been achieved in the area of species protection in general (Species Protection Index, score 2.5, ten-year change, 154th place) or terrestrial biome (Terrestrial biomes (national), score 20.9, ten-year change, 153rd; Terrestrial biomes (global), score 22.1, ten-year change, 156th). The position of Moldova in terms of representativeness of protected areas is still low (Protected Areas Representativeness Index, score 14.5, ten-year change +5.4, 133rd place). However, it should be noted that the country has adopted the Strategy on Biological Diversity for 2015–2020 and the Action Plan for its implementation (Government of the Republic of Moldova, 2015).

Land. In terms of ecosystem services, Moldova achieved the best results in terms of grassland and wetland loss (score 100, ten-year change +38.4 and +50.5, 1st place). However, the country has difficulties in preserving forest areas (tree cover loss, score 39.8, ten-year change -17.6, 54th place). According to FAOSTAT (FAO, 2019y), 11.75 percent of the country's area is covered with forests. Of the total forest area, 56.1 percent is afforestation and 43.4 percent is naturally regenerated forests. The share of the latter has decreased by 1 percent over ten years from 44.5 percent in 2009 (FAO, 2019z).

Lack of forest belts near agricultural land leads to erosion of the fertile soil layer by wind, and as a consequence the land becomes less fertile each year. To help prevent such desertification, Moldova approved the Environmental Strategy for 2014–2023 (Government of the Republic of Moldova, 2014), which set intermediate targets for expanding forest areas to 15 percent of the total area of the country. This implied planting forests on 150 000 ha of degraded land. Since 2016, annual government spending

on reforestation has increased significantly, and now amounts to about USD 0.8–1 million (FAO, 2019aa).

Emissions. Greenhouse gas emissions have not decreased (greenhouse gas intensity growth rate, score 43.4, ten-year change -30.6, 112th place), including per capita (greenhouse gas emissions per capita, score 67.4, ten-year change -5.2, 61st) (FAO, 2019ab).

The trend in the growth rate of methane (CH_4) emissions (score 82.3, ten-year change -17.7, 59th place) and Black Carbon (score 54.3, ten-year change -19.9, 88th place) is negative. The agricultural sector annually reduces CH_4 emissions (9.8 percent for 2009–2017) (FAO, 2019ac) due mainly to a reduction in livestock. However, nitrous oxide (N_2O) emissions have doubled (FAO, 2019ad).

The best indicator performance is recorded for the growth rate of nitrogen oxide (NOx) (score 100, ten-year change, 1st place). Significant deterioration was recorded for sulfur dioxide (SO_2) growth rates (score 52.2, ten-year change -47.8, 119th place) (FAO, 2019ae).

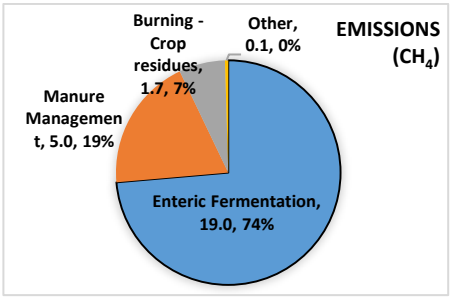


Figure 3. Methane (CH_4) emissions

As Figure 3 shows, an increase in emissions has been observed from burning of crop residues (+ 18.3 percent over ten years) and manure management (+ 6.9 percent). Enteric fermentation has decreased by 30.4 percent over ten years (FAO, 2019af).

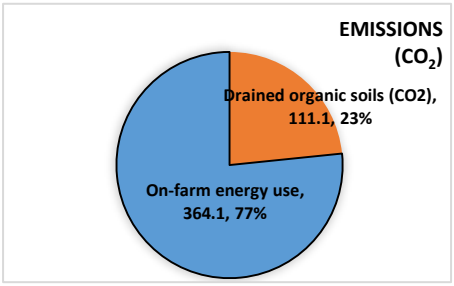


Figure 4. Carbon dioxide (CO_2) emissions

Moldova has one of the lowest CO_2 emission rates among all European countries, both overall and per capita. However, progress has not been achieved in ten years (CO_2 growth rate (score 43, ten-year change -12.8, 83rd place). Drainage of organic soils and energy use are the main causes of CO_2 emissions, and if emissions from drainage are reduced (-1, 2 percent over ten years), then emissions from electricity use will increase by two-thirds (FAO, 2019ag).

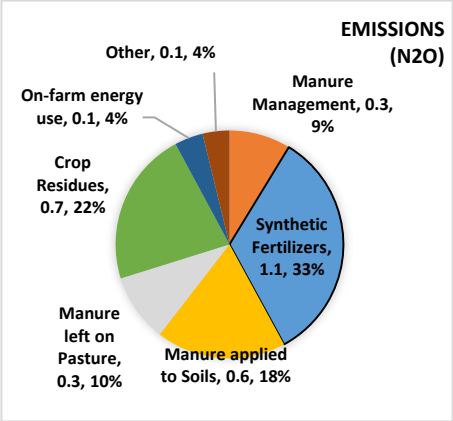


Figure 5. Nitrous oxide (N_2O) emissions

The use of nitrogen fertilizers is a major source of N_2O emissions accounting for one-third of total N_2O emissions. Over ten years the volume increased 2.5 times. The Sustainable Nitrogen Management Index, EPI (score 50.8, ten-year change -7.4, 49th place) ranks Moldova in 49th place, categorizing the ratio of use of nitrogen fertilizers to agricultural crop yields as inharmonious. N_2O emissions from manure applied to the soil have increased by a quarter over ten years, while emissions from manure left on pastures decreased by 18.9 percent, which is a natural consequence of the reduction in livestock numbers. Crop residues account for one-fifth of this total and show growth of 43.71 percent.

Waste emissions increased by 6.2 percent over ten years, including CO_2 by 11.8 percent and CH_4 by 7.1 percent. As part of the goal of preventing a rise in global temperature, Moldova has been set a target of a 70 percent reduction in emissions by 2030 (compared to 1990).

Chapter 5. Food system resilience

While there are many definitions of resilience, a basic one is: “the ability to prepare for, withstand, and recover from a crisis or disruption. A resilient food system is able to withstand and recover from disruptions in a way that ensures a sufficient supply of acceptable and accessible food for all” (JH CLF, 2021). There are different perspectives regarding the components of a resilient food systems; however, commonly agreed characteristics of resilience are: response diversity, modular connectivity, local self-organization, the ability to respond quickly, limited exposure to disturbances and readiness to transform, among others (Walker, 2020).

At the national scale, resilience is influenced by factors such as the level of self-sufficiency and the financial ability to balance food deficits with imports from other countries. Crises, whether natural or manufactured can cause considerable damage to food systems, and in turn, to the ability of people to access safe and affordable food. Conversely, building more resilient food systems ensures a steadier supply of safe food, accessible to all.

The resilience of food systems in the Republic of Moldova is influenced by a range of factors, including natural resources, agricultural practices, climate variability, market access and policy frameworks, among others.

The main vulnerabilities of Moldova’s food system include climate change and natural disasters, water scarcity and shortcomings in irrigation infrastructure, land degradation and soil erosion, abandonment of agricultural land and shortages of agricultural labour, and dependency of the public on foreign remittances. However, despite these challenges, there are several factors that contribute to the resilience of food systems in Moldova. These include the diversity of agricultural production, the market structure of the farming sector, the country’s long-standing tradition of preserving food for the winter months and the reorientation of agri-food trade towards EU markets. This chapter describes in more details some of these main factors.

Shortcomings in irrigation infrastructure: Most of Moldova’s agriculture is rainfed; only approximately 15 percent of farmed land is irrigated, and much of the irrigation infrastructure is in poor condition and low performing. Lack of irrigation limits production and yield potential and makes Moldova’s agriculture vulnerable to drought cycles. Because of its geographic location, Moldova is prone to volatile weather conditions that result in fluctuations in agricultural production, especially in the case of rainfed crops such as wheat, maize, sunflower seed or sugar beet (FAO, 2015a).

Climate change effects: Climate change is expected to further intensify the severity and frequency of extreme weather events such as drought and hail, which, in turn, diminishes the resilience of Moldova’s

food resources and the overall economy (FAO, 2015a). To strengthen the resiliency of agriculture to weather shocks, Moldova's government is developing programmes and implementing reforms that include incentivizing climate-smart agriculture practices, improving current agriculture insurance programmes and investing in irrigation infrastructure.

Emigration and shortages of agricultural labour: Due to significant emigration of the Moldovan population over the past 20 years, agricultural land and rural areas of the country are being abandoned which in turn, results, among others, in considerable shortages of agricultural labour, especially during harvest periods (ILO, 2021). The labour shortage has also contributed to a decline in agricultural productivity, which has had a negative impact on the country's food system. With fewer people working in agriculture, overall production of food in Moldova has decreased. This has resulted in a decrease in the availability of fresh, local food, which has provoked an increase in food imports from other countries. The population of Moldova is aging, and with younger people leaving the country, there are fewer people to take over the family farms. This has led to a decline in the number of small-scale farmers, which has had a negative impact on the diversity of crops grown in the country. With the emigration of younger people, there is less investment in the agricultural sector. The result is a lack of modernization and technological advancements in agriculture, which has further impacted the country's food system. Emigration has also led to changes in dietary habits in Moldova. With more people leaving the country, there are fewer people to consume traditional Moldovan foods, which has produced a shift in the types of food consumed, with an increase in the consumption of processed and imported foods.

Dependency on remittances: Remittances from Moldovan citizens working abroad, primarily in the Russian Federation and EU countries, constitute a significant portion of the country's GDP, estimated by the World Bank to be around 30 percent. However, the global financial crisis of 2008 and the COVID-19 pandemic have resulted in economic disruptions and job losses worldwide, affecting Moldova's remittance inflows. The decrease in remittances due to external shocks has various implications for Moldova's food system, including reduced household income and nutrition, increased food insecurity and decreased agricultural productivity and food supply (ILO, 2021).

Despite the negative impacts of a decentralized food system on productivity and access to wholesale or export markets, Moldova's small-scale farming and lack of supply chain coordination may provide better resilience to external or internal shocks. The country has a history of sustaining a relatively stable food consumption pattern through informal exchanges with neighbours and preserving their own food, which translates into higher food resiliency. For instance, Moldova was less impacted by the global food price spikes between 2008 and 2010 due to the strong domestic food supply from good crop years (OECD, 2021). However, this resiliency may be partially undermined by higher poverty rates and lower average daily caloric consumption in rural areas.

Moldova has been shifting its economic and agricultural sectors away from an historical dependency on the Russian Federation and towards the European Union and other Western markets. This shift was in

response to multiple import bans on Moldovan agricultural goods by the Russian Federation, which mainly impacted Moldovan exports of wine, fruits and vegetables, and sugar-derived products (OECD, 2021). The implementation of the Association Agreement between Moldova and the European Union in 2014 and the EU-Moldova Deep and Comprehensive Free Trade Area in 2016 facilitated trade by removing tariff and non-tariff barriers, resulting in a larger share of agricultural trade. This diversification made Moldova's food supply chain less vulnerable to possible Russian embargos. However, Moldova's agricultural sector still depends on traditional economic ties with Belarus, the Russian Federation and Ukraine for strategic imports and exports, and many farmers have yet to meet the quality and safety standards required to gain access to the EU market (OECD, 2021).

Chapter 6. Political and institutional governance for food system sustainability

As a country outside of the European Union, Moldova has limited capacity and financial means to make the transition from conventional to sustainable food systems. At the same time, several key institutions and programmes within the country work to support rural development, increase agriculture productivity, and support more sustainable agri-food production and consumption, thus contributing to the transition to more sustainable food systems. The following paragraphs highlight the institutions whose main activities influence one or more food system components.

The **Ministry of Agriculture, Regional Development and Environment** (MARDE) plays a leading policy role in rural sector and food industry development. It is also the focal point for climate change in the country, with its policy jurisdiction covering the areas of environmental protection (mainly via the National Institute of Ecology) and the use and management of natural resources (via Moldova's Water Agency) and waste.

Through the State Agrarian University of Moldova (UASM) and several research institutes, MARDE promotes knowledge and information development and dissemination, via research, extension and training services. Extension services are also provided by the National Agency for Rural Development (ACSA), which has a lead role in delivering direct advisory support to farmers through its 350+ consultants.

The following state bodies are also of relevance to food systems:

- The **National Food Safety Agency** (NFSA) is responsible for implementing state policy to regulate and control food safety and veterinary medicine, animal husbandry, plant protection and phytosanitary quarantine, seed control, food and feed product quality control.
- The **Agency for Intervention and Payments in Agriculture** (AIPA) is responsible for the administration of agricultural subsidy funds, allocating resources to support producers and controlling the usage of public money for such purposes.
- The **Moldova Investment and Export Promotion Organization** (MIEPO) is a public institution coordinating policy implementation for competitiveness, export promotion and investment attraction in Moldova.
- The **SME Development Organization**, ODIMM, is a public, non-commercial, non-profit institution which operates under the coordination of the Ministry of Economy and Infrastructure and other central and local authorities, business associations and business support providers, and aims to increase the competitiveness of small and medium-sized enterprises (SMEs), thereby contributing to sustainable economic development and the creation of new jobs.

A number of national strategies, policies and programmes, and projects have been designed and implemented during the last decade to build a sustainable and efficient agriculture and food industry sector, as well as to raise awareness and boost sustainable production and consumption of food products.

The main strategy is the "**Moldova Agriculture and Rural Development Strategy 2014–2020**" (MARDS). In 2014, the government adopted a national agriculture and rural development strategy for 2014–2020 and in 2015 developed an action plan to complement the strategy. This envisages "a competitive restructured and modernized agri-food business sector, improved living and working conditions in rural areas, [and] agri-food activities existing in harmony with the natural environment maintaining the biodiversity, cultural and traditional values for future generations. Evaluation of strategy implementation is ongoing.

The **European Neighbourhood Programme for Agriculture and Rural Development Business** (ENPARD) provides continuous support to long-term reforms of the agriculture and rural development sectors. It is particularly useful in helping to improve competitiveness and ensuring quick adaptation to standards for producing safe, high-quality agricultural products in line with EU Social Protection System (SPS) rules and quality requirements. Only by integrating EU directives into national law can Moldova receive the full benefit of EU market opportunities offered by the Deep and Comprehensive Free Trade Areas (DCFTAs). Ongoing support from the European Union has also helped Moldova withstand the consequences of limited market access to the Russian Federation, its major agricultural export destination. Additional support is provided through the Neighbourhood Investment Facility (NIF) – together with the European Investment Bank (EIB) – to help Moldova modernize its agricultural sector and assist the growth of SMEs.

One of the key support programmes in this sector is the **Moldova Agriculture Competitiveness Project** (MAC-P) by the World Bank with a total budget of USD 40 million covering 2012– 2019. It's main objective is to "enhance the competitiveness of the country's agro-food sector by supporting the modernization of the food safety management system, facilitating market access for farmers, and mainstreaming agro-environmental and sustainable land management practices" (World Bank, 2019b). One of the projects sub-components is aimed at providing investment support for post-harvest technologies by matching investment grants to emerging productive partnerships for the modernization of post-harvest technologies in the horticultural sector.

To date, the country has completed the National Programme on Nutrition and Diet for 2014–2020,[7] which aims to reduce the burden of preventable morbidity and disability and eliminate premature

[7] https://extranet.who.int/nutrition/gina/fr/node/23777

mortality due to noncommunicable diseases caused by diet, malnutrition and nutritional deficiencies. The results of the programme, however, have not yet been announced publicly.

The **Argo products storage development support programme** is an ENPARD[8] programme with a EUR 64 million budget that contributes to the implementation of national subsidy schemes. The objective of these schemes is to support investments related to the modernization of processing and storage of fruit and vegetables and multi-perennial plantations.

Post-harvest improvements such as cold chain and packaging were also subject to development assistance. In one of its former projects (ACED),[9] USAID integrated pre-cooling technology using SO_2 for cold storage in its technical assistance project.

[8] ENPARD, with a total budget of EUR 64 million, targets agriculture and rural development projects. Under this scheme, EUR 64 million is not directly transferred to the government and therefore is not at its disposal. Instead, the amount of EU 64 million merely indicates the annual upper limit of budgetary support from European Union to the government for agriculture and rural development.

[9] In support of the agricultural sector in Moldova, USAID completed the five-year project ACED in March 2016. Through technical assistance executed by contractors, USAID attempted to strengthen the foundations for sustainable development through direct knowledge transfer to the private sector and demonstrating the effects of its best practices.

Chapter 7. Conclusions

This report attempts to provide a general and systemic overview of the key components of the Republic of Moldova's national food system, identify hotspots of unsustainability and prioritize interventions at multiple scales.

As stipulated in Chapter 1, the analysis is based on two recently developed frameworks: the 2016 Global Panel Report on Agriculture and Food Systems for Nutrition and the Committee on World Food Security's (CFS) 2017 High-Level Panel of Experts on Food Security and Nutrition report *Nutrition and Food Systems*. Accordingly, the analysis focused on the following key food systems: (i) drivers, (ii) food supply chains (iii) food environments, (iv) consumer behaviour and (v) diets, as well as (vi) outcomes and (vii) policy, programmes and institutional actions relevant to food systems.

Based on the available data analysis and the interpretation of opinions expressed by various stakeholders interviewed during this research project, the following conclusions can be made.

The Republic of Moldova is a small landlocked country in Eastern Europe with a population of approximately 2.6 million people. Moldova is primarily an agricultural country: over 60 percent of its land area is used for agriculture. The country's food system is characterized by a mix of traditional and modern agriculture practices, a diverse range of crops and livestock, and significant reliance on small-scale farming, with family farms accounting for over 90 percent of all farms.

Moldova has a temperate climate and fertile soils, which are favourable for agriculture. Nevertheless, Moldova is vulnerable to natural disasters, including floods and droughts, which negatively impact agricultural production and food availability. Climate change is also affecting the country with rising temperatures and changing rainfall patterns affecting crop yields. Adapting to these changes will be crucial for the future of the food system in Moldova.

Moldova is a water-scarce country, and water management represents a significant challenge, particularly during periods of drought. These challenges are further compounded by the country's socio-economic conditions, which include high levels of poverty and unemployment.

Emigration has been a significant driver of the food system in the Republic of Moldova, and has triggered a significant decrease in agricultural workforce, which in turn led to a decline in agricultural production and an increase in food imports. Given the significant impact of emigration on the food system in Moldova, policy interventions are necessary to mitigate the negative effects.

The agricultural sector plays a critical role in the food system of Moldova. While the country has a relatively small land area, agriculture is an important economic activity. Approximately a quarter of the total population is employed in the sector, which accounts for around 12 percent of the country's GDP. Any changes or developments in the agricultural sector therefore have a significant impact on the food system.

The country's main agricultural products include fruits, vegetables, cereals and livestock products, with wine and walnuts being a particularly important export. Most farming in Moldova is carried out by small-scale farmers who rely on traditional methods of production. However, there is a growing trend towards modernization and the adoption of new technologies, including precision farming and the use of agrochemicals. The Government of Moldova has introduced policies aimed at improving the competitiveness of the agricultural sector and promoting sustainable farming practices.

Many small-scale farmers in Moldova face challenges in accessing markets. This limits their ability to sell their produce and generate income, which in turn affects the availability and affordability of food for consumers. Improving market access and infrastructure, such as roads and storage facilities, could help support the growth of the agricultural sector.

The food industry in Moldova is relatively small and fragmented, with most food production carried out by small and medium-sized enterprises. The country has a well-established wine industry, and a growing number of companies are involved in the production of fruits, vegetables and dairy products. Moldova has a strong tradition of preserving and processing food, including pickling, canning and smoking.

Despite the agricultural potential of Moldova, the country still imports a significant amount of food products. This highlights the need for increasing domestic production to meet the growing demand for food products.

The typical diet in Moldova is based on seasonal and locally grown products. Bread, dairy products and vegetables are staples of the Moldovan diet, with meat and fish consumed less frequently. The consumption of fruits and vegetables has increased in recent years, while the consumption of processed and high-fat foods has also risen. The country has a relatively low rate of obesity and a high level of physical activity among the population.

Despite its fertile soils and agricultural resources, Moldova faces challenges related to food security, particularly in rural areas. Poverty, lack of infrastructure and limited access to markets are among the factors that contribute to food insecurity in the country. The Government of Moldova has introduced

programmes aimed at improving food security, including the development of food banks and the promotion of small-scale farming.

The Government of Moldova has also taken several steps to strengthen the resilience of the country's food systems. These include initiatives to promote sustainable land use practices, improve water management and support smallholder farmers. The government has also implemented policies to improve market access for farmers and increase the value of agricultural products, including through the promotion of organic agriculture and the development of agro-tourism.

Chapter 8. Towards food systems sustainability – potential next steps

The following non-exhaustive list of topics and specific issues, which surfaced from the data analysis and discussions with stakeholders engaged in the project, could be recommended for consideration by relevant authorities and decision-makers.

Governance for developing sustainable food systems

- Ensure a comprehensive understanding of the food system approach. This is currently absent from Moldova's sustainability agenda and is urgently needed. Based on the example of the European Union, which has recently adopted the "Farm to Fork" Strategy, the food system approach and its integration into relevant strategies, specifically, the National Development Strategy Moldova 2030 and the upcoming new National Strategy on Agriculture and Rural Development for the period 2021–2027, as well as policies and National Action Plans by line ministries, are likely to contribute to the development of a more productive and sustainable agri-food sector in the country, increased levels of incomes and better livelihoods in rural areas of the country.
- Promote and integrate an inclusive approach into policy-making. Consultations with and the participation of a broad pool of food systems stakeholders in the decision-making process related to food system policy development are crucial to ensure all voices are heard and opinions considered.

Climate change adaptation for agriculture and the promotion of a CSA approach

- Increase the access of farmers to technology and information through farmer education, both generally and specifically on adaptation to climate change.
- Improve the dissemination of hydrometeorological information to farmers.
- Investigate options for crop insurance, particularly for drought.
- Encourage private sector measures to ensure efficient adaptation to climate change.
- Promote a climate-smart agriculture (CSA) approach, where enhanced productivity, strengthened resilience and a low-emissions agricultural development are seen as integral parts of the same goal, creating a pathway for the sustainable growth of the agricultural sector.

Research, innovation and education

- Innovation, new technologies and environmentally friendly techniques across the whole agri-food chain are a necessary condition for sustainable food production.
    - Increase investments for the modernization of production, apply research findings to the production process and incorporate new technologies in agriculture.
    - Use food innovation in food production and consumption to support the transformation needed to achieve climate goals.

- Introduce new technologies which respect the environment, such as environmentally friendly packaging, and apply innovations to the production and distribution processes of food manufacture, such as bio-active food ingredients.

- Enhanced research, skills development and linking the agri-food sector to tertiary education are essential.
  - Ensure stronger research activity in universities and communication with other research institutions and the industry.
  - Promote national collaboration among universities and companies in the agri-food sector as the basis for a unified programme where working farmers can start, continue or complete their training and education, discover new methods and technologies, develop an entrepreneurial spirit, form groups for collaborative production and create strong links with key players in the industry.

Collaboration and production development

- Stronger collaboration among key players and improved cost efficiency are essential.
  - Expand agricultural production and efficiency by upsizing average farms and market-based production schemes, in order to reduce dependency on imports.
  - Connect an operations network starting before the farm and ending at the consumer with supply chains (logistics), enabling cost reductions, improvement in product quality and increases market penetration.
  - Further apply innovative procedures in the agri-food sector to marketing and branding, security and quality, reduction of production costs and meeting the special needs of consumers.
  - Develop stronger relationships between food industry key players and use domestically produced agricultural products in the food and beverages industry, through collaborations such as contract farming.

Food loss and waste (FLW) reduction and prevention

- Address at the national, regional and local levels the issue of FLW by a developing a comprehensive national strategy on FLW prevention. In addition, create attractive conditions for investments in post-harvest storage capacities, including cold storage, and raise awareness among the general public, especially younger generations.
  - Use the National FLW strategy to create a clear framework for action on FLW reduction.
  - Given the cross-cutting nature of FLW, develop an overall FLW strategy that provides a clear framework for action for policymakers in different ministries, as well as business, academia and civil society organizations. A national strategy should also cover commitments to measure FLW using internationally agreed methods and include timebound FLW reduction targets (i.e. meeting UN SDG 12.3 target of halving per capita global FLW by 2030).

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Annexes

Annex 1. Sustainable food systems and FAO-BSEC project considerations

Food systems approaches have grown in popularity and importance as policymakers and governments recognize their critical importance for achieving the Sustainable Development Goals (SDGs) by 2030.

FAO defines food systems as follows:

> The agri-food system covers the journey of food from farm to table – including when it is grown, fished, harvested, processed, packaged, transported, distributed, traded, bought, prepared, eaten and disposed of. It also encompasses non-food products that also constitute livelihoods and all of the people as well as the activities, investments and choices that play a part in getting us these food and agricultural products. In the FAO Constitution, the term "agriculture" and its derivatives include fisheries, marine products, forestry and primary forestry products (FAO, 2021).

Multiple other definitions exist (see Barrett *et al*., 2020), most of which highlight the need to balance economic, social and environmental sustainability demands in a food system that provides income, returns on assets, tax revenue for the government, nutritious and safe food to consumers, and positive socio-economic and environmental benefits (FAO, 2018g). The holistic nature of food system analysis sets it apart from other approaches. It focuses on dynamic relationships between drivers, the structural nature of the system itself and the outcomes that these interactions deliver or fail to deliver. This approach accepts that food systems change and evolve. While certain stages or trajectories of food system development can be identified, no singular food system exists either globally or domestically. Rather, multiple food systems co-exist and interact in diverse ways. Food systems approaches recognize the existence of trade-offs between goals and seek to inform policymakers of their options and the potential implications of policy decisions. This is not, however, a normative approach with a "correct" answer. Instead, food systems represent an analytical framework to visualize and inform decisions that balance demands with local needs in order to develop tailored solutions.

The Black Sea region is a strategically important geographical location connecting Europe and Asia and home to a rich bio-diverse ecosystem including unique marine habitats. All food systems rely upon natural resources, which are currently under threat due to changing climate conditions and human behaviour. In addition, intensive and uncontrolled agricultural practices put extensive pressure on nature and may lead to deforestation, biodiversity loss, land degradation and conversion of natural habitats. In the light of these threats, enabling sound sustainable food systems has been identified as a priority for Black Sea Economic Cooperation (BSEC) countries. Tackling these issues necessitates

countries acting together to establish a platform (mechanism) integrating instruments for the sustainable management of natural resources and reduction of food losses and waste in value chains. BSEC aims to take concrete steps and achieve tangible results in the areas of sustainable agriculture and agro-industry, which in turn should open up the agricultural potential of the region.

Maintaining sustainable food systems requires extensive research to develop united approaches to common challenges, and experience and evidence sharing to learn from each other. During the BSEC Agriculture Ministers Meeting held in Türkiye in May 2017, and subsequent meetings, the BSEC member states agreed to establish the "BSEC – Regional Cooperation Centre for Sustainable Food Systems", in partnership with FAO and the Republic of Türkiye.

This initiative may assist the BSEC member states in implementing joint research programmes, special training activities, exchange of information and knowledge within the BSEC region, on sustainable food systems. By the end of the project, the BSEC member states should have strengthened their capacity to analyse and monitor food systems for sustainability and implement projects to make food systems more sustainable.

The BSEC Regional Cooperation Centre for Sustainable Food Systems (BSEC-CSFS) will directly contribute to SDG 12 (responsible consumption and production) and SDG 2 (zero hunger), and indirectly to all the other Goals. The BSEC member states will benefit from the work of the BSEC-CSFS, as they will receive advice, guidance and information on making food systems in BSEC states more sustainable. This will be achieved through capacity development of government officials and other stakeholders in sustainable agricultural production, enhanced agricultural trade and enhanced regional cooperation/competitiveness of member states in food and agriculture products. The main outcome of the project will be stronger regional cooperation in the areas of food security and safety, improved institutional capacities, poverty alleviation, and sustainable natural resource management including aquatic resources. The BSEC-CSFS will prepare the BSEC Regional Sustainable Food Systems Programmes and Action Plans and support the activities and projects for their implementation. The Centre will conduct co-programmes on sustainable food systems and cooperate closely with other international organizations if deemed appropriate.

Among the different outputs and results needed to reach the above-mention project impacts and outcomes, the BSEC-CSFS is preparing the **Review Report on the Current State of Sustainable Food Systems in the BSEC Region**. A team of experts and national and international consultants have been recruited to collect and analysis primary and secondary data on food systems in their countries with a view to assessing the sustainability of their national food systems. Food Systems Assessments Profiles have been prepared for each of the 13 member states, which in turn will be used to prepare a regional report on the state of food systems in the BSEC region, including gender gaps.

The process has been enriched by the participation of National Focal Points and Alternates in each BSEC member state, as well as the involvement of universities and institutions that have reviewed the reports on the state of food systems in the BSEC countries.

Annex 2. Rapid food systems assessment methodology

The creation of sustainable food systems is critical to achieving the SDGs, and means connecting discrete issues – livelihoods, climate resilience and biodiversity, as well as nutritional status, access and affordability of healthy foods, and consumer preferences, among others. Production, consumption and markets must all be recognized as interrelated parts of one system, in order to perceive potential synergies and trade-offs and identify potential pathways forward.

Traditionally, these issues have been studied and monitored separately, an approach that inhibits efforts to understand and assess food systems and their dynamics, especially in low- and middle-income countries, where these systems are changing fastest. Indeed, the absence of a holistic view precludes effective decision-making. This Food System Country Profile consolidates and helps make sense of existing data to support more informed and evidence-based decisions; curb negative outcomes such as malnutrition in all its forms, food loss and waste, or unsustainable environmental footprints; and improve food system sustainability.

This profile seeks to provide public and private sector decision-makers with a holistic and systemic overview of the key components critical for the sustainability of the Moldovan national food system, in order to identify hotspots of unsustainability and prioritize interventions at multiple scales.

To develop this profile the following steps were implemented:

- Compilation and assessment of existing data on the components of the national food system using international datasets (FAOSTAT, World Bank statistics, GFSI, GINI Index, etc.) as well as relevant national datasets (NBS). This exercise focused on the last decade but, where relevant, included some historical data.
- Based on available data, a map was constructed of existing knowledge on the national food system. The process started with international data, which were classified based on quality and consistency over the period 2008–2019 across three categories: good (the green areas in the heatmap indicate that at least 85 percent of the indicators have available data), partial (yellow indicates mixed data availability) and missing (red means that all or the bulk of data on indicators are missing). Higher quality data helped to identify key trends and provide an initial narrative of the evolution of the national food system.

- To complement existing available international data and better assess the emerging narrative, gaps were identified and targeted semi-structured interviews conducted with local food system actors. In Moldova, this translated into interviews with a total of 12 actors[10] from across the food system. In some cases, this led to the incorporation of additional national datasets while in others it helped to understand the tendencies and dynamics at play in the national food system and further sharpen the narrative.
- Finally, information gathered through data and interviews was combined in the present document to provide a snapshot of the key drivers and the present status and outcomes of the national food system. This exercise represents a first step towards achieving a more holistic understanding of the Bulgarian food system. Nonetheless, it is recommended to undertake additional data collection, analysis and ongoing engagement with key food system actors in order to deepen understanding, identify additional priority action areas and move towards coherent and integrated policies to improve the social, economic and environmental performance of the food system.

Figure 6. Heat map

[10] The Chamber of Commerce and Industry of Moldova (CCIM), the Moldova Organic Value Chain Alliance (MOVCA), the National Federation of Small Family Farmers, the Moldovan Walnut Producers Association, the Moldova Fruit Association, the Centre for Education and Rural Development, the Honey Producers Association, ECO-VISIO, ClimBiz, the Agency for Intervention and Payments in Agriculture (AIPA), the Food Safety Agency and MARDE.

Annex 3. Stakeholder mapping and main actors

Institutions	Website	Contact person	Priority thematic area of work
Relevant institutions working at national level (*) in BSEC member states (Moldova)			
Public			
Food Safety Agency (public)	www.ansa.gov.md/en	info@ansa.gov.md	Food safety and control body in Moldova
Agency for Intervention and Payments in Agriculture	http://aipa.gov.md/en	Sergiu Batiușca, VD sergiu.batiusca@aipa.gov.md	Promoting the sustainable development of Moldova's agriculture and ensuring the wellbeing of rural areas
Academia and research			
State Agrarian University of Moldova	https://uasm.md/en	Prof. Volconovici Liviu info@uasm.md	Agronomy-horticulture/natural resources development and agricultural engineering
NGOs and civil society			
ECO-VISIO	www.ecovisio.org	Valeria Svart valeria@ecovisio.org	Grassroots non-profit organization for sustainable development, an empowered society, a healthy environment and a fair, vigorous economy. Focuses on sustainable food systems/agri-food/food waste prevention/sustainable tourism/education/rural development-community/social and green entrepreneurship/consulting
ClimBiz	www.climbiz.org	Bojan Jankovic bojan Jankovic.consult@gmail.com	A spin-off of the UNDP project "Climate and Business Initiative", ClimBiz activities focus on sustainable development, including argi-products and tourism, green entrepreneurship development and support, green argi-products research and promotion, and sustainable food systems
Centre for Education and Rural Development	www.aocedr.md/en	Aurelia Litvin (CEO) cedr@inbox.ru	Focuses on the training of young rural entrepreneurs and promoting and supporting the interests of young people from Moldova who want to start a business
Moldova Fruit Association	https://moldovafruct.md/en	Liliana Beregoi lberegoi@moldovafruct.md	The largest fruit producer and exporter association of Moldova
Moldovan Walnut Producers Association		Oleg Tîrsînă	Moldovan walnut producer and exporter association

		oleg.tirsina@gmail.com	
National Federation of Small Family Farmers (FNFM)	www.fnfm.md	fnfmoldova@gmail.com	FNFM is a farmers organization oriented towards sustainable development of the rural area and increasing the incomes of family farms. It represents 5 000 farmers and land owners
Moldova Organic Value Chain Alliance (MOVCA)	www.movca.md	Alexei Micu info@movca.org, alexei.micu@gmail.com	MOVCA is a non-governmental, membership-based business association for organic agriculture and food products in the Republic of Moldova. Its members include producers, processors, exporters, consultants, retailers, active consumers and other stakeholders
Chamber of Commerce and Industry of Moldova (CCIM)	www.chamber.md	President: Sergiu Harea camera@chamber.md	The CCI of the Republic of Moldova is the most representative institution focusing on the country's business environment. It contributes to increased competitiveness of Moldovan enterprises, economic modernization and the promotion of international trade