AGRICULTURE DEVELOPMENT IN THE CENTRAL ASIA REGIONAL ECONOMIC COOPERATION PROGRAM MEMBER COUNTRIES

REVIEW OF TRENDS, CHALLENGES, AND OPPORTUNITIES

INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE

DECEMBER 2019

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Notes:
In this publication, "$" refers to United States dollars.
ADB recognizes "Kyrgyzstan" as the Kyrgyz Republic, "China" as the People's Republic of China and "Russia" as the Russian Federation.

On the cover: From production, processing, transport, and consumption—agricultural and food systems driving economic growth and promoting agricultural diversification and harmonization (photos by Al Benavente, Eric Sales, Gerhard Joren/ADB).

Cover design by Jan Carlo Dela Cruz.

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FOREWORD

CAREC 2030 was the framework approved during the 16th Ministerial Conference on CAREC held in Dushanbe, Tajikistan in 2017. It expanded the scope of the Central Asia Regional Economic Cooperation (CAREC) Program beyond trade, transport, and energy. CAREC 2030 covers five operational clusters: (i) economic and financial stability; (ii) trade, tourism, and economic corridors; (iii) infrastructure and economic connectivity; (iv) agriculture and water; and (v) human development. Under agriculture, support for sanitary and phytosanitary measures and transboundary animal disease control are crucial for integrating CAREC countries into global agricultural value chains, as is securing water supply through coordinated river basin management and improved irrigation. The CAREC program and its member countries are gearing up for regional activities in these areas.

How well positioned are CAREC countries to participate in regional and global value chains? What challenges and obstacles do they face? What are their strengths, and what opportunities can they tap into to succeed? This study takes stock of the 11 CAREC countries' agriculture systems and identifies gaps as well as areas for regionwide cooperation and collaboration both in terms of policies and programs. The International Food Policy Research Institute carried out this study under a partnership between the Asian Development Bank and the CAREC Institute. The CAREC Institute will consider recommendations from this paper as they develop programs to build capacities of CAREC member countries in agriculture and trade.

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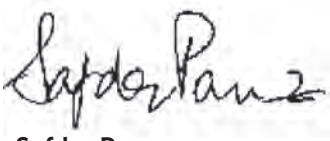

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This abridged report was prepared by Bui Minh Giap, principal natural resources and agriculture economist, Central and West Asia Department (CWRD), ADB, based on the original desk study of the International Food Policy Research Institute (IFPRI) led by Kamiljon Akramov and Kevin Chen. Saad Paracha and Bui Minh Giap of ADB and Saeed Qadir of CI supervised and provided technical inputs to the IFPRI desk study. Dennis De Jesus, ADB, and Ronaldo Oblepias, consultant, provided additional guidance and administrative support. Randall Jones and Yaozhou Zhou of ADB, Antonio Jesus Quilloy of the University of the Philippines Los Baños, and Kevin Ross Rutter, freelance agricultural development advisor, reviewed and proofread the abridged report. Kristine Joy S. Villagracia, ADB, provided administrative assistance to the publishing process.

ABBREVIATIONS

ADB	Asian Development Bank
BRI	Belt and Road Initiative
CAREC	Central Asia Regional Economic Cooperation
CMCs	CAREC member countries
EEU	Eurasian Economic Union
FAO	Food and Agriculture Organization of the United Nations
GDP	gross domestic product
NADF	National Agricultural Development Framework
PRC	People's Republic of China
SPS	sanitary and phytosanitary
UN	United Nations
US	United States
USAID	United States Agency for International Development
WTO	World Trade Organization

WEIGHTS AND MEASURES

ha	hectare
kcal	kilocalorie
km^3	cubic kilometer
m^3	cubic meter

EXECUTIVE SUMMARY

This report takes a comprehensive look at agricultural and food systems of the Central Asia Regional Economic Cooperation (CAREC) member countries (CMCs) and provides policy-relevant information that can serve as a basis for designing possible policy interventions for revitalizing the agriculture sectors of the CAREC region. The region represents a diverse group of countries in terms of history, economy, culture, and population. The drive for regional cooperation and integration is relatively recent for the CMCs, compared with other large global regions.

As of 2019, all CMCs have undertaken reforms to improve the performance of their agriculture sectors. These policy reforms steered the CAREC region from a centrally-planned to a market-oriented agriculture sector. Central Asia, the South Caucasus, and Mongolia adopted a market-oriented agricultural system in the 1990s, largely precipitated by the economic decline due to the fall of the Soviet Union. Meanwhile, major reforms in the People's Republic of China (PRC) were launched in the late 1970s.

Land reform was an important component in the former communist bloc CMCs, where collective farming was predominant. Although the implementation of the land reform varied in the CMCs, it aimed to redistribute responsibility for managing collective agricultural land to individual farmers, whether through lease rights or outright ownership. In the former Soviet Union republics of the CAREC region, decollectivization was undertaken relatively quickly following independence, though land redistribution continued in some areas through the 2000s. Land reform in Afghanistan and Pakistan failed to implement widespread reform, increasing the number of multigenerational landless farmers.

One of the immediate consequences of land reform was the emergence of smallholder farming. The change in the predominant mode of farming, particularly in the former Soviet republics, produced lasting effects on the nature of agricultural production. For example, livestock and egg production were previously carried out on large collective farms with government support, but now small farm production systems dominate. Although crop productivity improved, particularly among horticultural crops, the economic potential of smallholder farming is constrained by farm fragmentation. Most often, smallholders have no adequate access to processing, transport, and retail facilities for their goods, creating postharvest losses and missing income opportunities. For this reason, policy makers are paying more attention to strengthening agricultural value chains and designing ways to provide support services to fill institutional voids created by the decline of large-scale farming.

In support of more efficient agricultural value chains, CAREC governments are pursuing agricultural diversification strategies, in contrast to older agricultural policies that emphasized food security. For many countries in the region, agricultural diversification has highlighted high-value agriculture such as horticulture and oilseed production. However, having compartmentalized agricultural value chains can be an obstacle in providing high-value agricultural products to consumers, especially as they tend to be perishable.

A lack of access to and inadequacy of transport, storage, and processing facilities weaken agricultural value chains and lead to lost opportunities for maximizing farm and export earnings.

Besides strengthening agricultural value chains, enhancing agricultural trade requires harmonized cross-border customs and logistics procedures. As of 2019, governments have facilitated coordination and strengthened transboundary disease control systems and sanitary and phytosanitary (SPS) measures among CMCs. Growing international coordination on SPS and transboundary disease concerns have important implications for trade in high-value agriculture products, particularly for livestock. The Eurasian Economic Union and the Belt and Road Initiative represent two international strategies that focus on facilitating trade harmonization and infrastructure development.

As national governments seek to develop their respective agriculture sectors, they also contend with limited land and water resources, especially in view of climate change. Most populated and key agricultural areas in the region are in arid or semiarid zones that rely on irrigation fed by glacial melts. Although climate projections vary, average temperatures will increase and glacial melt will decrease in the long term, as most analysts believe. Flooding and drought episodes suggest more irregular rainfall patterns and are expected to become more frequent.

The breadth and interconnectedness of the challenges confronting CAREC's agriculture sectors afford governments, development organizations, and other stakeholders of agriculture a look at opportunities for collaborative research and development interventions. The diversity of expertise and experiences among CMCs—which applies not only to technical capacities and financial resources but also to institutional best practices and policy lessons—can be leveraged to facilitate research and knowledge exchanges.

I AGRICULTURAL PRODUCTION

CENTRAL ASIA AND THE SOUTH CAUCASUS

Grain Production

Wheat is the main agricultural product in Central Asia (Kazakhstan, the Kyrgyz Republic, Tajikistan, Turkmenistan, and Uzbekistan) and the South Caucasus (Azerbaijan and Georgia). Its importance in household consumption makes it the most important crop for regional food security.[1] Given wheat's economic importance, the wheat subsector has historically been the target of heavy state intervention. All countries in the region regard domestic wheat production as a pillar of national food security as illustrated by the common drive in Central Asia and the South Caucasus to concentrate on wheat farming amid economic crises that followed the fall of the Soviet Union.

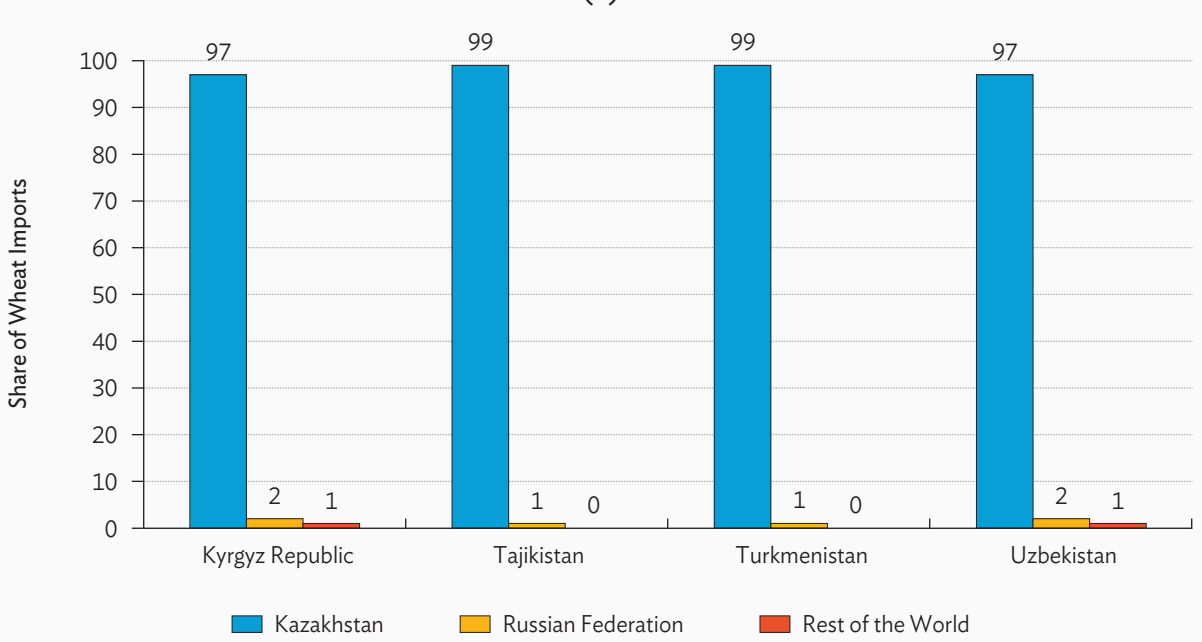
Increased focus on grain production meant more competition for land with higher-value crops such as fruit and vegetables. Land allocation is a useful indicator of state policy priorities because most countries in the region treated wheat as a strategic staple crop and a target for intervention. According to the Food and Agriculture Organization of the United Nations (FAO), the share of land planted to wheat was highest in Tajikistan at 65.4%, followed by Kazakhstan (59.7%), Uzbekistan (53.9%), the Kyrgyz Republic (32.7%), and Turkmenistan (20.4%) in Central Asia (FAO, Food and Agriculture Organization Corporate Statistical Database [FAOSTAT]). A shift from wheat production since 2006 has increased imports of wheat and wheat products, particularly from Kazakhstan. In 2016, Kazakhstan was the world's 12th largest exporter of wheat (Simoes and Hidalgo 2011); and the main supplier of wheat and other grain products to other Central Asian countries (Figure 1).

Kazakhstan wheat is exported to the rest of the region to the north (the Kyrgyz Republic and Uzbekistan) by rail. Shipments to southern Kyrgyz Republic, other Central Asian countries, and northern Afghanistan pass through Uzbekistan. Once in the Kyrgyz Republic and Tajikistan, wheat is transferred to trucks with limited capacity and the ensuing route crosses mountainous terrain.

These direct and indirect access routes between Kazakhstan and other Central Asian countries create a wide range of transportation costs from $50 to $90 per ton (Svanidze et al. 2016; Ilyasov et al. 2016).

[1] Consumption of wheat products is high by world standards throughout the Central Asian countries, with the notable exception of Kazakhstan, where calorie intake from animal products has overtaken intake from grains. The consumption of wheat products reached their peak in the late 1990s in all Central Asian countries but has receded since. Still, based on data obtained from FAOSTAT, wheat products comprise around half of the total daily calorie intake in Azerbaijan, Tajikistan, Turkmenistan, and Uzbekistan.

Figure 1: Share of Wheat Imports from Major Producers, Central Asia, 2006–2013



Source: M. Svanidze et al. 2016. *Spatial Integration of Wheat Markets in the Regions of South Caucasus and Central Asia: Evidence from Armenia, Azerbaijan, Georgia and Kyrgyzstan*. Paper prepared for the 56th Annual Conference of the German Association of Agricultural Economists. Bonn, Germany. 28–30 September.

Meanwhile, wheat and wheat products destined outside the region normally pass through Black Sea ports, which involve high costs and stiff competition with Russian wheat during the peak trading season. Because of the high cost imposed by traditional transport routes, Kazakhstan has diversified its export routes by building grain terminals on the Caspian Sea and established new trade links with the People's Republic of China (PRC), Iran, and other Middle Eastern and Asian countries.

Livestock and Dairy Production

During Soviet times, the Central Asia and South Caucasus regions operated large-scale production on state farms. Household farms and other smallholders dominate the present system of livestock production. The transition to the current fragmented ownership began with a sharp decrease in livestock following independence, as farmers liquidated much of their herds to reduce costs. Fragmentation of the region's livestock farms has been accompanied by a shortage of vital support services that retarded productivity growth. In response, regional governments have attempted to fill the institutional void in livestock support services by focusing on marketing and value chains. Improvements in livestock value chains (i.e., investment in cold storage and processing facilities) will play an important role in satisfying the growing demand for meat and milk products throughout Central Asia and the South Caucasus and in nearby overseas markets, including the PRC and the Middle East.

Bovine tuberculosis, brucellosis, rabies, and anthrax are endemic to Central Asia, which make veterinary services essential to the viability of the region's livestock sector. However, veterinary services were among the many institutions that suffered after the collapse of the Soviet Union. Pure genetic lines of livestock that were rigorously managed under the Soviet system have now largely been lost because of indiscriminate breeding and poor regulation. Artificial insemination services exist throughout the region but are not widely used because of farmers' lack of resources and familiarity with artificial insemination.

Horticulture Production

Horticulture in Central Asia is similarly small-scale and managed by private households with little support and direction from the government. Even in Turkmenistan, where state control of agricultural production is most rigid, over 80% of fruit and vegetables are grown by private farms (Lerman et al. 2012).

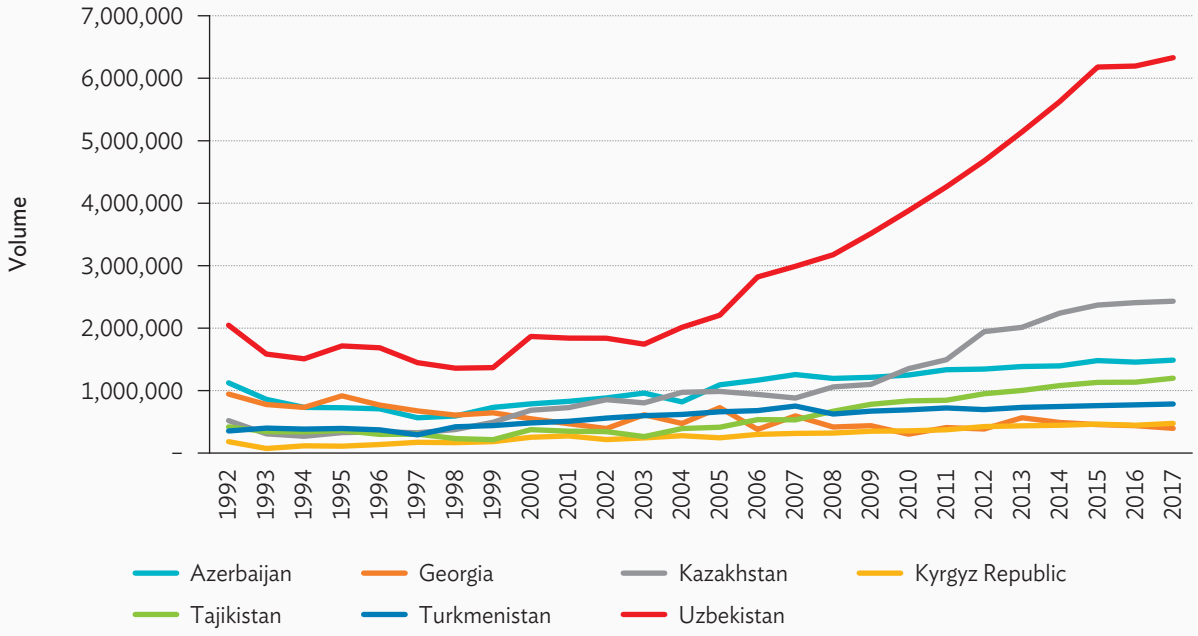
Most countries in the region have favorable climatic conditions for agriculture, especially in the Fergana Valley. In terms of weather, water, and soil fertility, natural endowments in Uzbekistan are comparable to those found in major horticultural producing regions in Chile, Turkey, and California (Larson et al. 2015). Likewise, Azerbaijan has natural comparative advantages in selected perennial tree crops including apples, pomegranates, olives, and hazelnuts (Aksoy et al. 2018). The relatively mild climate in the southern regions of Central Asia and the South Caucasus allows for multiple cropping intensities for vegetables in irrigated areas. These natural conditions allow for the shift from relatively low value cotton and grain to higher-value horticultural crops such as fruit and nuts.

In general, fruit production has increased steadily in almost all countries of Central Asia (especially Uzbekistan and Kazakhstan) (Figure 2) and the South Caucasus except for Georgia, which has not seen fruit production recover to its pre-independence levels. Similar patterns can be observed for vegetable production (Figure 3).

Uzbekistan has historically been the largest producer of vegetables in the region and has seen steady growth over a sustained period since the late 1990s. Likewise, Kazakhstan is a large producer of vegetables, with southern areas being the dominant horticultural production zone. However, similar to the trend seen in fruit production, Georgia's vegetable production has stagnated and even decreased over the same period.

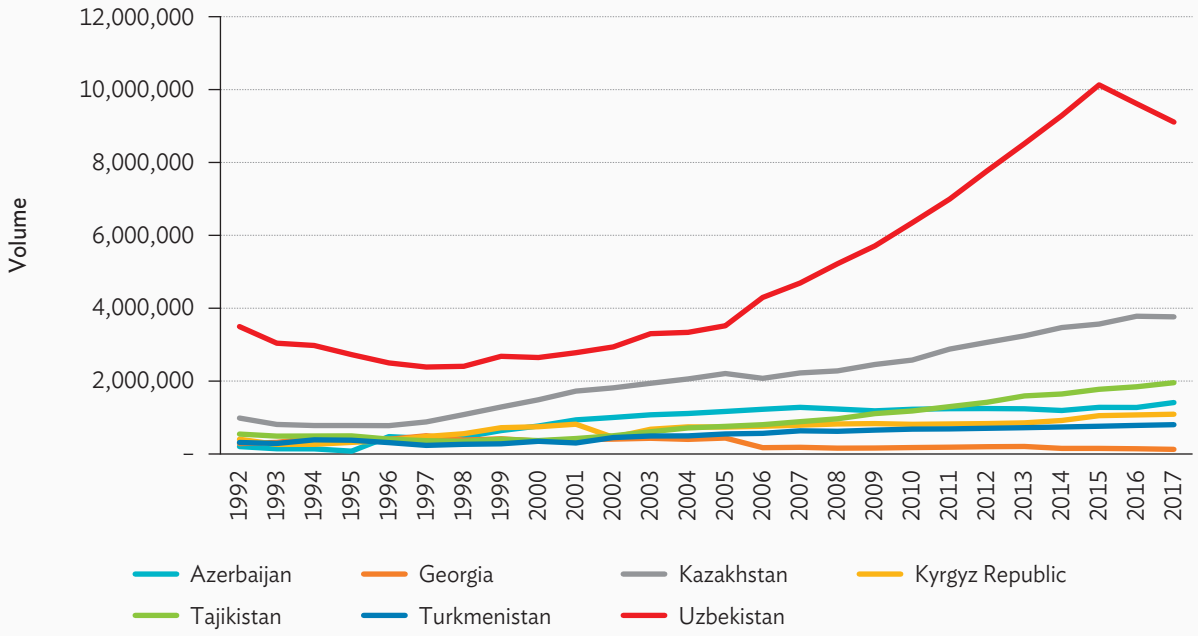
Fruit and vegetables grown in the region were traditionally exported to the Russian Federation. However, trade with the Russian Federation diminished in the 1990s because of logistic and economic barriers along major trade routes. The slowdown of horticultural exports was also due to the lack of processing facilities and poor food safety standards.

Figure 2: Fruit Production, 1992–2017
(metric ton)



Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Figure 3: Vegetable Production, 1992–2017
(metric ton)



Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

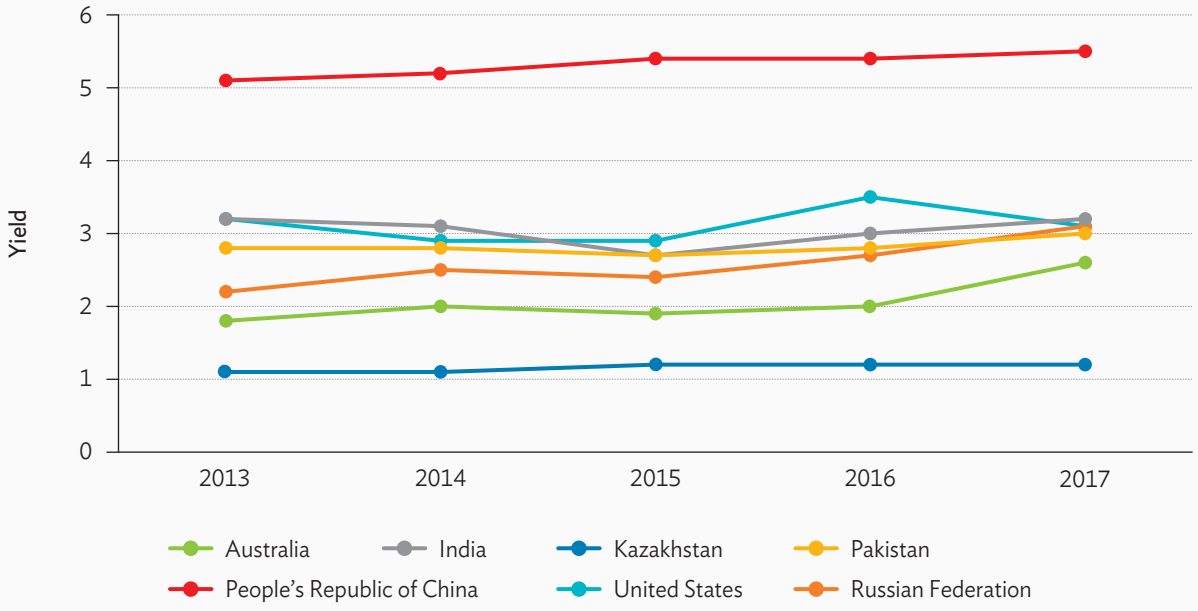
AFGHANISTAN AND PAKISTAN

Grain Production

Afghanistan's generally arid climate leads to a dependence on irrigation, not lending itself to long-term wheat production. However, it has one of the highest per capita consumption of wheat, especially among poor communities where wheat represents 57% of the daily calorific intake. With the high domestic demand, wheat is cultivated predominantly for the domestic market on 2.3 million hectares (ha) in 2017 (64% of the country's land area).

Meanwhile, Pakistan (the world's 8th largest wheat producer and 10th for rice) produces for both domestic and export markets. Valdés (2013) noted that rice represented 44% of Pakistan's agricultural export earnings, as wheat yields in Pakistan are comparable to those of other major wheat producing nations (Figure 4). Pakistan reports an average annual wheat yield of 3 tons/ha, which is on par with major wheat exporting countries such as the Russian Federation and the United States (US).

Figure 4: Wheat Yield in Selected Countries, 2013–2017
(metric ton per hectare)



Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Livestock Production

Afghanistan relies on imports to meet the domestic demand for meat, eggs, and dairy products. Imports largely come from India, Pakistan, Iran, and the United Arab Emirates (World Bank 2014). The persistently low productivity in Afghanistan's livestock subsector is rooted in the fragmented nature of the sector and, more importantly, in the inadequacy or lack of production and marketing services. Veterinary and regulatory systems that support livestock production are inadequate and outdated, resulting in uncontrollable disease outbreaks and widespread animal malnutrition. Farmers in more distant rural areas and nomadic herders have poor access to livestock support systems. Nomadic livestock production still occurs in Afghanistan, mostly by the Kuchi minority. The nomadic Kuchis are estimated to comprise 5.2% (1.6 million people) of Afghanistan's population (World Food Programme [WFP], United Nations Environment Programme [UNEP], and National Environmental Protection Agency [NEPA] 2016).

Pakistan's livestock subsector, on the other hand, has demonstrated steady growth, especially in the face of increasing demand for livestock products due to a growing and rapidly urbanized population. The country's livestock subsector represents approximately 56% of value addition in agriculture and employs roughly 30 million people (Rehman et al. 2017). Pakistan contains the world's third-largest livestock herd and is the world's fifth-largest producer of milk (FAO 2012c). Since 2003, the poultry industry has exhibited strong growth in both meat and egg production, largely aided by increased financial investments and adoption of new technologies that took place in the late 1990s (Hussain et al. 2015). Despite the increased production of poultry products, its external trade is low and has not realized the potential experienced in other livestock subsectors. In 2016, total poultry exports were valued at $2.7 million (FAO, FAOSTAT).

Horticulture Production

Afghanistan has a long history of horticultural production because of its diverse geographic and climate conditions. Prior to the 1970s, Afghanistan was among the global leaders in the production of various nuts, dried fruits, and fruit including almonds, pomegranates, pistachios, grapes, and apricots (World Bank 2014). During this period, Afghanistan supplied around 20% of the world's raisins (Government of Afghanistan, Ministry of Agriculture, Irrigation and Livestock). Political instability and economic uncertainty caused many farmers to grow cereal crops over horticultural crops to guarantee their food security (World Bank 2014). Much of Afghanistan's perennial horticultural production comes from old orchards, which need replacement and modernization of production systems. Nevertheless, horticulture production (particularly for grapes, watermelons, melons, apples, oilseeds, and other fruit) has been growing since 2010 (Government of Afghanistan, Central Statistics Organization 2018).

Major horticultural crops in Pakistan include citrus, mangoes, apples, dates, and onions (Government of Pakistan, Ministry of National Food Security and Research 2016). Pakistan is among the world's largest producers of horticultural crops because of its climate that is favorable for growing subtropical and tropical crops. It is the world's third-largest producer of dates and the fifth-largest producer of mangoes (FAO 2012c). In 2016, Pakistan exported $659 million worth of fruit and vegetables (FAO, FAOSTAT).

The country is also a large importer of horticulture crops, importing a total value of $1.3 billion in 2016. It also produces various spices in large quantities, including garlic, chili peppers, coriander, and turmeric. Despite the relatively large export potential of horticultural crops, the area upon which these crops are grown has remained relatively steady during this period.

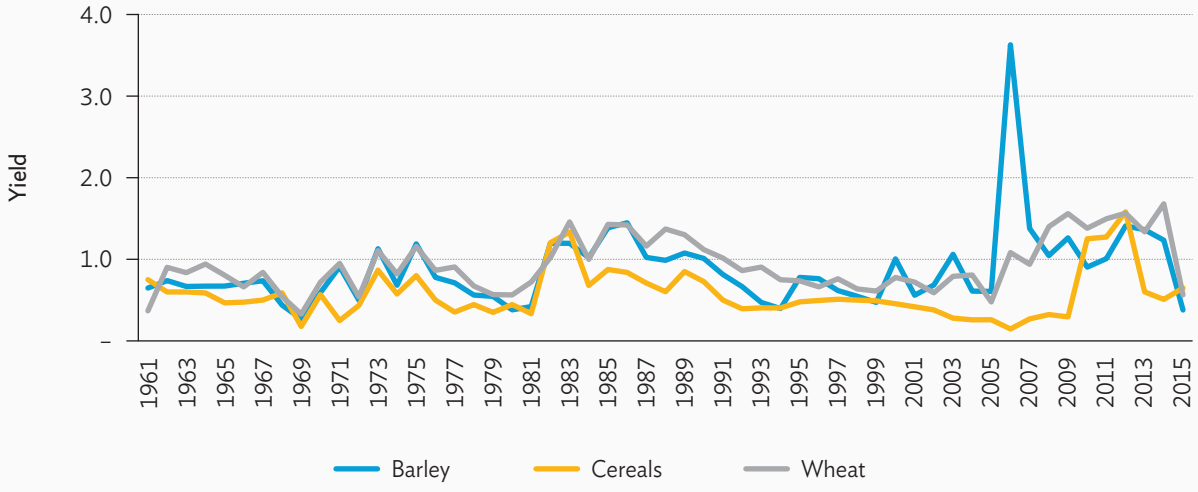
MONGOLIA

Crop Production

Major crops produced in Mongolia are wheat, potatoes, and different types of fruit and vegetables. These crops are grown on around 15% of the country's total land area. Out of the total cropped area, approximately 79% is planted to wheat. In 2017, wheat production was 238,102 tons, accounting for around 52% of Mongolia's total crop production. However, the area planted to wheat has declined because of farmers' preference for growing high-value crops such as potatoes and vegetables (FAO, FAOSTAT; FAO and WFP 2017).

Crop yields in Mongolia are generally low (Figure 5), mainly attributed to poor seed quality, lack of irrigation infrastructure, low mechanization, plant diseases, and severe weather (FAO, FAOSTAT). Because of poor farm-level performance, Mongolia has been a net importer of crops and processed food products, especially wheat. In 2017, however, Mongolia started to export its fruit and nut products whose total export value was estimated at $41 million.

Figure 5: Mongolian Grain Yields, 1961–2015
(metric ton per hectare)



Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Livestock Production

Livestock production (sheep, goat, cattle, horse, and camels) dominate Mongolia's agriculture sector despite the sector's small land area relative to the country's crops subsector. Extensive rangeland production systems generate low incomes because of limited value addition and susceptibility to natural hazards, especially droughts and extremely low temperatures and snow (FAO and WFP 2017).

The vulnerability of Mongolia's livestock subsector to natural hazards is heightened because of the general practice of traditional extensive grazing, in which livestock are herded on pastures with little supplementary feed. This production method leads not only to low productivity but also to increased pressure on pastures (Rasmussen and Annor-Frempong 2015). The vulnerability of the country's livestock subsector has resulted in low export earnings, and this has manifested as a comparative disadvantage of its meat products with respect to the rest of the world.[2] On the other hand, poultry production has steadily improved because of active market development and adequate policy support.

PEOPLE'S REPUBLIC OF CHINA

Crop Production

The main crops produced in the PRC are maize, rice, vegetables, wheat, sugarcane, and potatoes. From 1978 to 2017, maize, rice, and wheat production steadily increased, largely driven by improved productivity of corn (FAO, FAOSTAT).

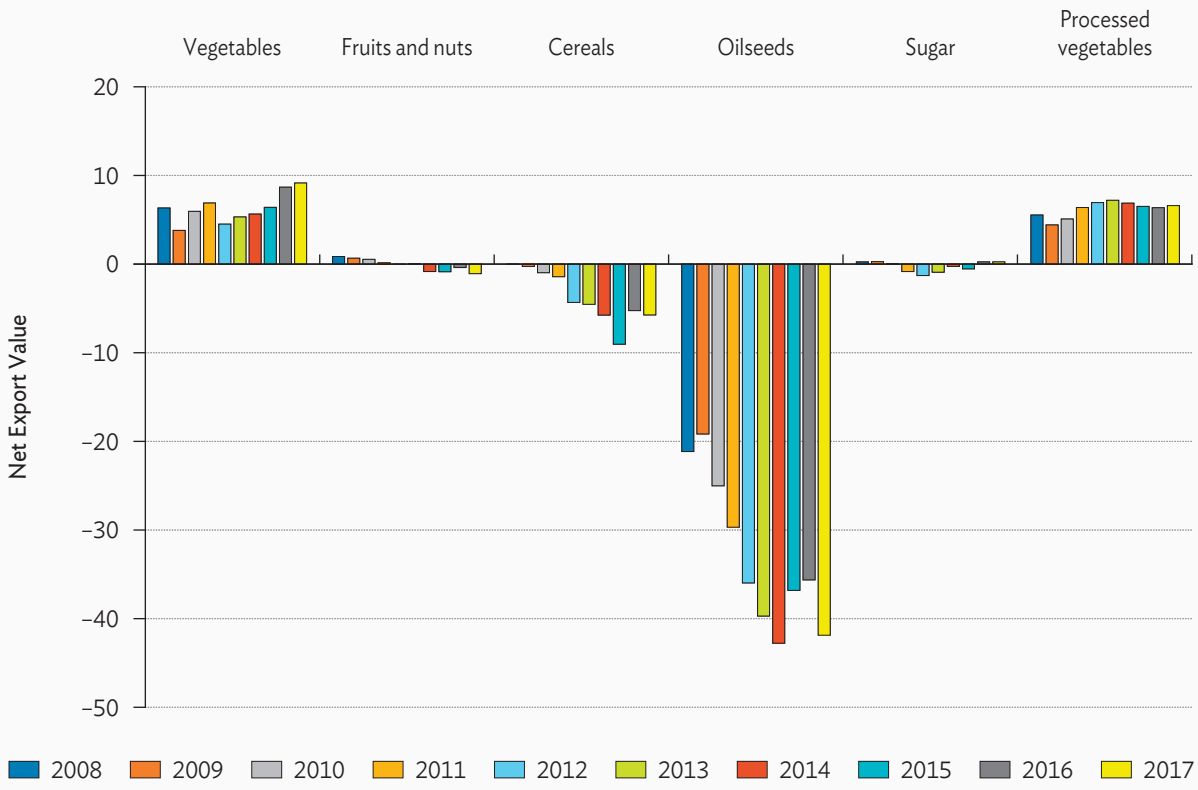
High-value horticultural crops also play an increasingly important role in the agriculture sector (Huang and Rozelle 2018). From 1977 to 2017, the average annual growth rate of fruit production was 11.5%, significantly higher than those of cotton (3.8%), sugarcane (5.3%), and edible oils (6.4%) (Government of the People's Republic of China, National Bureau of Statistics of China 2019). The PRC has also become a net exporter of fresh and processed vegetables in 2008–2017 (Figure 6).

Livestock Production

Livestock production has been growing rapidly from 1996 to 2017, where meat production rose by an average of 2.6% per year (Government of the People's Republic of China, National Bureau of Statistics of China 2019). Dairy production increased at an even greater rate, with an average annual increase of 9% during 1996–2017 (Huang and Rozelle 2018). However, animal diseases periodically cause serious problems for the livestock sector (USDA 2018). For example, the outbreaks of African swine fever in 2018 decreased the pig population by 16% as of March 2019, resulting in increased pork prices.

[2] UN Comtrade reported that Mongolia's revealed comparative advantage for meat is 0.41 in 2017.

Figure 6: Net Export Value of Crop and Food Products in the People's Republic of China, 2008–2017 ($ billion)



Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

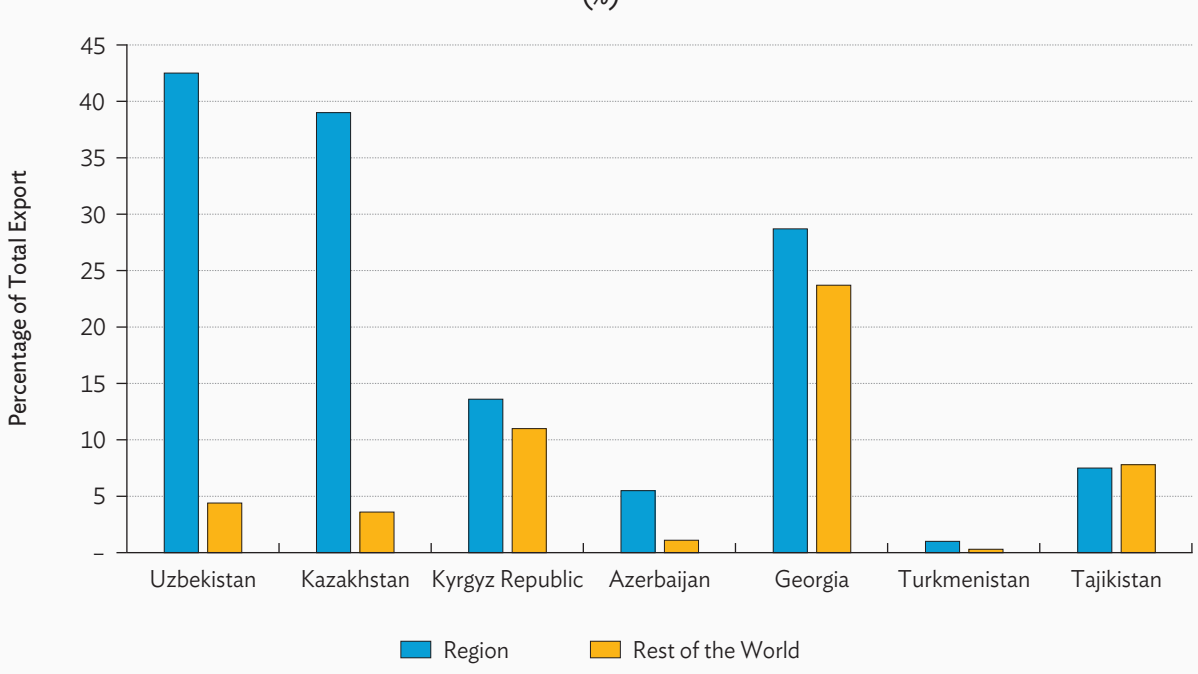
The development of the PRC's economy and the rising rate of urbanization triggered the increased demand for meat, leading to greater production and import of livestock products (Gale 2015). As of 2019, the country has become the world's largest importer of animal protein and dairy products. Brazil, the US, and Australia are three of the most important meat and offal exporters to PRC. In 2017, the value of imports was $1.8 billion from Brazil, $1.6 billion from the US, and $1 billion from Australia. These three countries together accounted for 42.6% of the PRC's imports in 2017. Meanwhile, New Zealand alone contributed 54.7% of the PRC's dairy imports in 2017 (United Nations [UN] Comtrade).

II AGRICULTURE AND INTERNATIONAL TRADE

CENTRAL ASIA AND THE SOUTH CAUCASUS

Kazakhstan, Uzbekistan, and Azerbaijan export various energy and mineral resources aside from agricultural products. Turkmenistan is also among the major exporters of energy and mineral resources, but its agricultural exports to other countries in the region remain low. The disparity of agricultural trade within the region and with the rest of the world is narrower for Georgia, the Kyrgyz Republic, and Tajikistan. Agricultural and food exports from these countries are often destined for the Russian Federation, an important market for regional exporters. Figure 7 provides a comparison of food and agricultural exports to the region (comprised of the five Central Asian countries, Azerbaijan, and Georgia) and to the rest of the world.

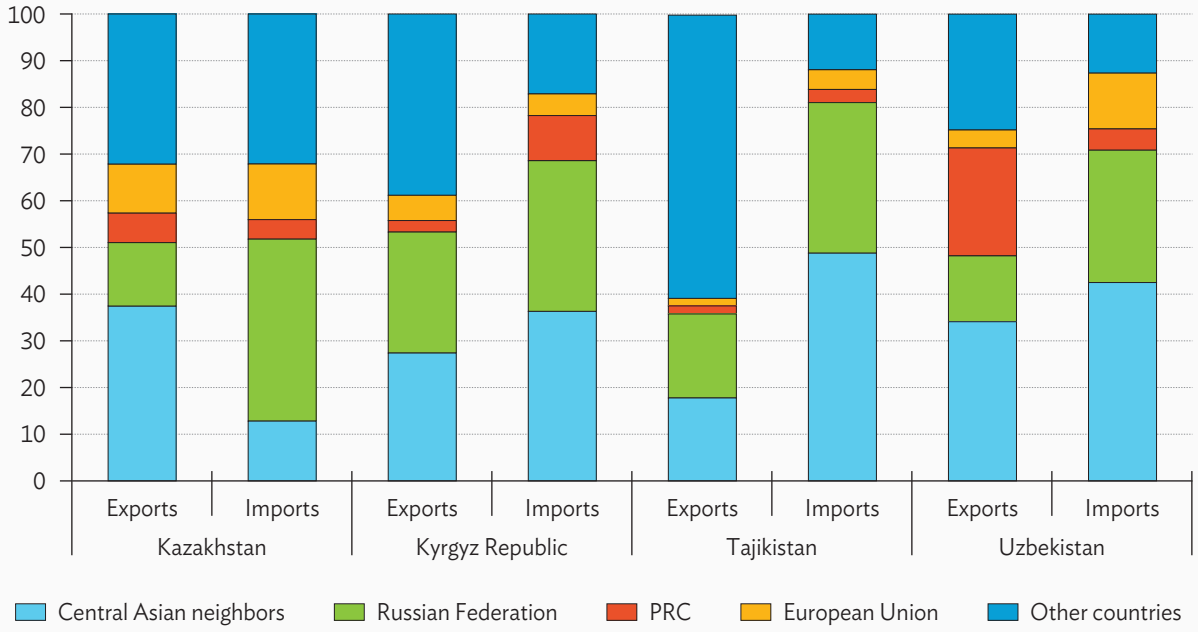
Figure 7: Food and Agricultural Exports as Percentage of Total Exports, 2017



Note: Figures for Uzbekistan, Turkmenistan, and Tajikistan do not include bilateral trade between the three countries due to lack of data.

Source: A. Simoes and C. Hidalgo. 2011. *The Economic Complexity Observatory: An Analytical Tool for Understanding the Dynamics of Economic Development.* Scalable Integration of Analytics and Visualization. https://pdfs.semanticscholar.org/7733/68ce1faa36d9ac833b3c3412d136033b91c1.pdf.

Figure 8: Share of Total Agri-Food Trade by Origin/Destination in Central Asia, 2016
(%)



PRC = People's Republic of China.
Source: International Labour Organization. ILOSTAT Database (accessed 31 October 2016).

Figure 8 provides details of export destinations and import sources of agricultural and food products for Kazakhstan, the Kyrgyz Republic, Tajikistan, and Uzbekistan. For agricultural imports and exports, most agri-food trade occurs between Central Asia and the Russian Federation. Tajikistan is the exception, with more than 60% of its agri-food exports destined to markets outside Central Asia and the Russian Federation. Uzbekistan's agricultural and food exports to the PRC make up around 20% of the total, which is relatively high compared with the other Central Asian countries.

Central Asia is one of the world's least globally integrated regions, ranking last among all regions of Asia in terms of economic integration (Huh and Park 2017). The World Bank reported that Central Asian countries are among the worst in terms of logistics performance and physical and policy infrastructure, clearly impeding trade. On the other hand, the World Bank also noted that Central Asia and Azerbaijan had improved their trade performance over 5 years, with only Georgia witnessing a small slide in the rankings (Rastogi and Arvis 2014).

As of 2019, governments have taken steps to improve regional integration and have begun to understand the importance of imports in supporting all aspects of the agricultural value chain. Externally driven projects such as the Chinese Belt and Road Initiative (BRI) and the Russian Federation-led Eurasian Economic Union (EEU) have benefited the region's agriculture sector and promoted regional integration.

Eurasian Economic Union

Composed initially of Belarus, Kazakhstan, and the Russian Federation, the EEU is a formal trade bloc that succeeded and superseded several trade agreements among select former Soviet republics. The EEU formalized the creation of a unified customs and trade bloc, removed customs controls between borders, and facilitated trade with nonmember states by creating an integrated transit network (Rastogi and Arvis 2014).

One of the immediate benefits of joining the EEU is preferential access to the Russian labor market, given that the Russian Federation tightened visa and immigration requirements for foreign workers, which have become economically prohibitive for many migrants. Following the Russian economic crisis in 2014–2015, the pipeline of remittances between the Russian Federation and Central Asia evaporated. However, among the three largest labor-supplying countries of the region—Uzbekistan, Tajikistan, and the Kyrgyz Republic—the Kyrgyz Republic was the first to recover lost ground, largely because it was able to take advantage of preferential EEU labor laws.

The Kyrgyz Republic's experience in joining the EEU may serve as a guiding example for other countries considering their options for accession. Joining the EEU has placed pressure on the Kyrgyz Republic to improve its regulatory mechanisms and other support structures to meet the rest of the bloc's standards. EEU member states demanded that the Kyrgyz Republic pass an audit of its food safety standards prior to its accession. Even after sanitary and phytosanitary (SPS) controls were removed along its border with Kazakhstan after accession, veterinary controls remained in place to give Kyrgyz authorities additional time to finish the implementation of the required provisions of the EEU (USDA 2016). Meanwhile, the Kyrgyz Republic received permission from the bloc to phase out existing tariff rates by 2020 for selected agricultural products (USDA 2016). These provisions are not unique to the Kyrgyz Republic, as Kazakhstan also received permission to charge different tariff rates for selected products to ensure its compliance with its separate commitments as a member of the World Trade Organization (WTO).

Belt and Road Initiative in Central Asia

Previously known as the "One Belt One Road Strategy," the BRI in Central Asia provided a conceptual framework for a series of Chinese-led infrastructure and aid projects in the region. The BRI sought to improve trade connectivity across the Eurasian landmass, linking the PRC with markets in Europe, the Middle East, Africa, and South Asia through infrastructure investment. Central Asia plays a key role within this initiative as it borders both the PRC and several European markets.

Two of the proposed belts under the BRI will cross Central Asian territory. The northern belt will cross from Kazakhstan and the Russian Federation to Europe, while the central belt will pass through several Central Asian countries to the Middle East.[3] In support of the BRI, major rail infrastructure has already been completed to boost trade capacities with the PRC, Kazakhstan, and the Kyrgyz Republic (Rastogi and Arvis 2014). Moreover, the PRC and Kazakhstan have created a special economic zone on their common border at Khorgos.

[3] The Asian Infrastructure Investment Bank (AIIB), established in 2015, provides financial support to BRI projects.

The introduction of the BRI dovetails with an increasing Chinese economic presence in the Central Asian region. Total trade between the PRC and Central Asia has already surpassed Central Asia's trade with the Russian Federation, the region's main traditional trading partner. The PRC has signed trade agreements with Kazakhstan, Uzbekistan, and other countries in the region that give food products from Central Asia access to Chinese markets. Chinese companies have also invested heavily in the agriculture sector in Central Asia. For example, Chinese agribusinesses have invested in Tajikistan's agriculture, including individual farms (Hofman 2016).

Regional Reconciliation and Trade

While the first 2 decades of independence were marked by conflict and disagreement among Central Asian and South Caucasus countries, regional governments have taken a more conciliatory approach in recent years. Uzbekistan is the only country that borders all four Central Asian countries and the only one engaging in political disputes with its neighboring countries. The opening of Uzbekistan has provided a key stimulus for greater trade in the region. The political conflict between Uzbekistan and Tajikistan over Tajikistan's proposed Rogun Dam Project was resolved in 2017 and led to a 9-fold increase in Tajikistan's agricultural export and a 10-fold increase in Uzbekistan's total export to Tajikistan (Government of Tajikistan, Statistical Agency under President of the Republic of Tajikistan). Trade between the Kyrgyz Republic, Kazakhstan, and Uzbekistan also saw increases between 2016 and 2017, although not as significant as that between Uzbekistan and Tajikistan. Despite the political tension between Uzbekistan and the Kyrgyz Republic over land delimitation and water resource sharing, trade during the mid-2010s proceeded steadily.

AFGHANISTAN AND PAKISTAN

In 2017, Afghanistan's total merchandise export was comprised of 80% agricultural products, exported largely to India (47%) and Pakistan (45%). Some of the most commonly exported crops are grapes, cotton, and a variety of tree crops (fruit and nuts). To facilitate trade, Afghanistan's Ministry of Commerce and Industries abolished a dual licensing system for businesses that required exporters to trade licenses from the Afghanistan Investment Support Agency (AISA) and the Ministry of Commerce and Industries (World Bank 2017b). Afghanistan has also made considerable headway in improving its global connectivity by establishing new air routes with India and by resolving border issues with Pakistan (World Bank, World Integrated Trade Solution).

Pakistan has a well-documented history of intervening in the trade of certain crops, especially wheat, rice, and sugar. Import controls, in addition to tariffs, have prevented foreign wheat (including competing products from Kazakhstan, the Russian Federation, and Ukraine) from entering Pakistan (Prikhodko and Zrilyi 2013). While greater trade with neighboring countries could have provided mutual benefits, prospects for greater agricultural trade between Pakistan and India run counter to political sensitivities for domestic producers in both countries. India granted Pakistan preferential trade status in the 1990s, shortly after gaining accession into the WTO. However, trade barriers continued to persist on both sides, and India ultimately revoked that status in February 2019.

Pakistan's long-term national development plan, known as "Vision 2025," aimed to transform the country into a private sector-led major exporter by 2025 (FAO 2016). However, recent policies, such as the export ban of wheat imposed during the global food price crisis of 2007–2008 and tariffs on imported agricultural products, signal lingering opposition to trade liberalization, even after the simplification of tariff systems in the mid-1990s (Valdés 2013). Furthermore, even if partial and full exemptions were introduced for certain commodities in the mid-2000s, tariff levels for those commodities remained high, hindering Pakistan's greater participation in global value chains. In 2015, Pakistan announced a three-year Strategy Trade Policy Framework, 2015–2018, which aimed to place exports at the center of economic growth (FAO 2016). However, from 2015 to 2017, Pakistani exports recorded negative growth each year (World Bank World Integrated Trade Solution).

MONGOLIA

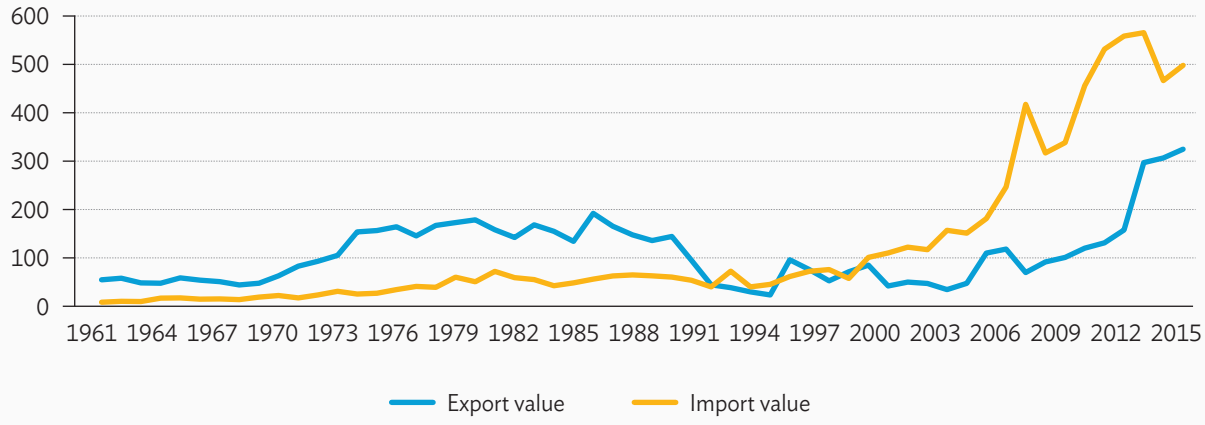
Mongolia's agricultural exports include horsemeat, wool, and cashmere, while its major trading partners are the PRC and the Russian Federation. Despite the extensive, low-cost livestock production systems, Mongolian meat exports are constrained mainly because of fragmented value chains, poor logistics, weak food safety systems, and high vulnerability to extreme weather (Enkhbold). Specific issues revolving around Mongolia's relatively poor trade performance are (i) limited cold storage capacity and temperature-controlled warehouse space (Rasmussen and Annor-Frempong 2015; Oxford Business Group 2015); (ii) weak SPS standards, especially regarding foot-and-mouth disease (Rasmussen and Annor-Frempong 2015; FAO, FAOSTAT); and (iii) lack of large processing facilities, especially for cashmere (Oxford Business Group 2015).

Mongolia imports large quantities of cereals, vegetables, and processed products (UN Comtrade). Since 2000, agricultural imports have far exceeded agricultural exports (Figure 9). In 2016, total import values reached $498 million, while total exports were valued at $325 million (FAO, FAOSTAT).

PEOPLE'S REPUBLIC OF CHINA

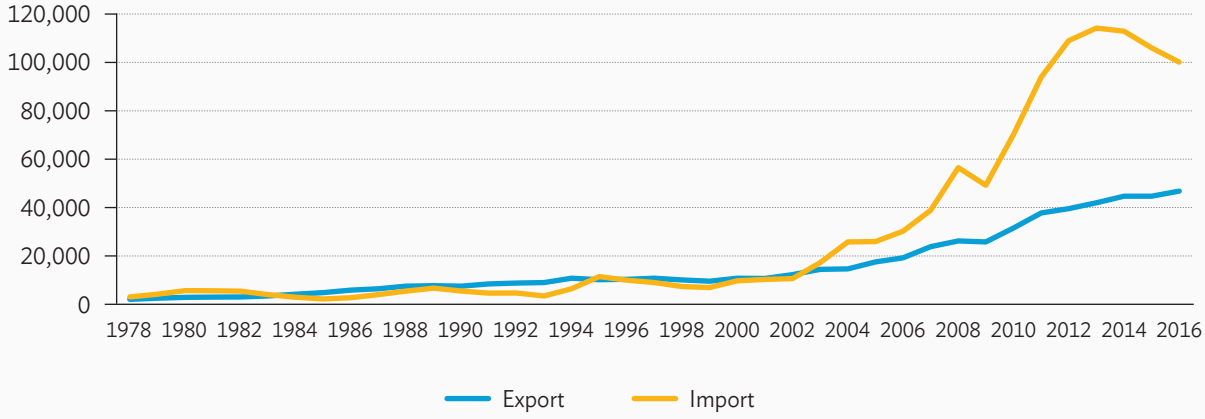
Since the PRC's accession into the WTO in 2002, the value of its agricultural imports has surpassed that of agricultural exports. In 2013, when its trade deficit was highest, imports were $114 billion, while exports remained around $45 billion (Figure 10). The persistence of a trade deficit since 2002 may partly be construed as a weakness of the country's agricultural value chains. Challenges faced by the PRC's agricultural value chain (Gilmour and Cheng 2004) include (i) lack of transportation and critical support infrastructure including cold chain transportation, and (ii) lack of value addition for basic agricultural goods. In addition, only 30% of the nation's food products are processed, whereas this figure typically reaches 70%–80% in more developed countries.

Figure 9: Value of Agricultural Trade in Mongolia, 1961–2015
($ million)



Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Figure 10: Agricultural Trade in the People's Republic of China, 1978–2016
($ million)



Source: Food and Agriculture Organization of the United Nations. FAOSTAT (accessed 31 October 2019).

The formation of the BRI provides avenues for the PRC to enhance its global market reach. The BRI established three economic corridors that involve the construction of transport infrastructure to enhance market connectivity: (i) PRC–Mongolia–Russian Federation economic corridor, (ii) PRC–Pakistan economic corridor, and (iii) PRC–Central Asia–West Asia economic corridor. Agro-industrial parks are expected to be established along the corridors to serve as a base for processing, logistics, and research activities.

III NATURAL RESOURCE CONSTRAINTS AND CLIMATE CHANGE

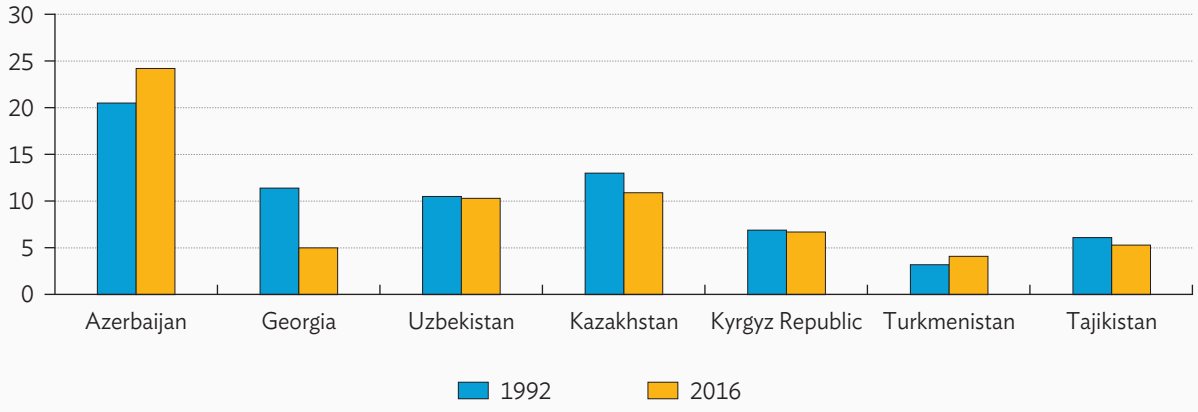
CENTRAL ASIA AND THE SOUTH CAUCASUS

Land and Water Resources

Countries in the region have many different climate types, including in large areas ill-suited for agriculture, such as deserts and mountains. The smaller countries of Central Asia and the South Caucasus (Azerbaijan, Georgia, the Kyrgyz Republic, and Tajikistan) have mountainous terrain that limits the extent of arable land and increases areas exposed to the risk of erosion. Specifically, agricultural land in the region vary widely in terms of topography and climate; hence annual average precipitation is low in lower-lying areas and high in mountain ranges. The average annual precipitation in the region is approximately 273 millimeters, but it ranges from 161 millimeters in Turkmenistan to 691 millimeters in Tajikistan (Frenken 2013).

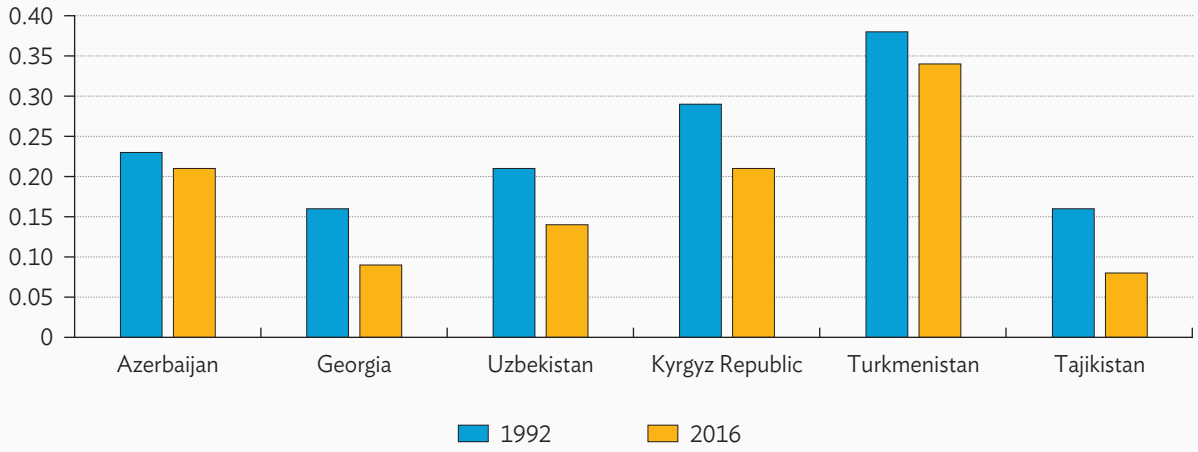
The proportion of arable land to total land area is low (Figure 11). Arable farmland is limited, which resulted to small arable land area per person (Figure 12), except for Kazakhstan. Kazakhstan has been excluded from the figure to highlight the small land areas of other countries in the region. Nevertheless, the average arable land size per person has decreased from 2.13 ha in 1992 to 1.65 ha in 2016. Arable land as a percentage of the total land in Georgia sharply decreased between 1992 and 2016, from 11.4% to 5.0%.

Figure 11: Arable Land, 1992–2016
(% of total area)



Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Figure 12: Average Arable Land per Person, 1992–2016
(hectare)



Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Central Asia has five river basins—Amu Darya, Syr Darya, Balkhash–Alakol, Ob–Irtysh, and Ural (ADB 2010). The Balkhash–Alakol basin feeds Lake Balkhash. The waters of the Ob–Irtysh basin ultimately flow into the Arctic Ocean, whereas those of Ural basin deliver to the Caspian Sea. The Amu Darya and Syr Darya rivers previously fed the now largely desiccated Aral Sea. Nonetheless, the Amu Darya and Syr Darya are the two largest rivers and the main sources of water in Central Asia. The two river basins provide around 90% of the region's river water and cover about 37% of the land area of Central Asian countries, including most of the Kyrgyz Republic, Tajikistan, and Uzbekistan, as well as large parts of Turkmenistan and Kazakhstan (Russell 2018).

The Amu Darya river is 1,415 kilometers long and has the largest capacity in Central Asia. It originates from the confluence of the Panj and Vakhsh rivers in Tajikistan and flows through Afghanistan, Uzbekistan, and Turkmenistan. When combined, annual flows from the Amu Darya and Syr Darya rivers are around 77 cubic kilometers (km^3) of water, of which 96% is used for irrigation (Izquierdo et al. 2010).

Water resources in Central Asia are managed by several dams, reservoirs, and canals. As of 2013, these structures were assessed as having reached nearly the end of their economic life (Bucknall et al. 2003). There are over 1,200 dams across Central Asian countries, 110 of which are classified as large dams having structural heights of over 15 meters.

The total capacity of dams in Central Asian countries is 176.8 km^3. Kazakhstan accounts for 95.5 km^3 (54% of the region's total dam capacity), Tajikistan for 29.5 km^3 (17%), the Kyrgyz Republic for 23.5 km^3 (13%), Uzbekistan for 22.2 km^3 (13%), and Turkmenistan for only 6.2 km^3 (3%) (Frenken 2013).

Fifteen dams have capacities greater than 1 km^3, six of which are in Uzbekistan, four in Kazakhstan, two in Turkmenistan, two in Tajikistan, and one in the Kyrgyz Republic. Most are multipurpose dams for hydropower generation, irrigation, water supply, and flood control. In total, these 15 large dams account for 130.6 km^3, or about 74% of the region's combined dam capacity (Frenken 2013). The poor condition of the retention structures has led to excessive water losses, low irrigation efficiency, waterlogging, widespread soil salinization, and declining crop yields.

Total annual water use for Central Asia in 2018 was approximately 125 km^3. From 1992 to 2007—given that wheat is produced in rainfed conditions and predominantly rely on rainfall for irrigation—the average water footprint per ton for wheat production was 1,440 m^3/ton in Kazakhstan, 1,779 m^3/ton in the Kyrgyz Republic, 2,068 m^3/ton in Uzbekistan, 2,831 m^3/ton in Turkmenistan, and 3,931 m^3/ton in Tajikistan (FAO, AQUASTAT Main Database).[4] Meanwhile, rice is mainly produced in the region by using surface water and groundwater. From 1992 to 2007, the water footprint of rice production was 2,635 m^3/ton in Kazakhstan, 3,498 m^3/ton in the Kyrgyz Republic, 4,032 m^3/ton in Tajikistan, 4,240 m^3/ton in Uzbekistan, and 7,014 m^3/ton in Turkmenistan (FAO, AQUASTAT Main Database).

Central Asian countries are forced together by the challenges of sharing their common water resources. A key dilemma stems from inherent conflicts in interest between downstream countries (Kazakhstan, Uzbekistan, and Turkmenistan) and upstream countries (the Kyrgyz Republic and Tajikistan) over the distribution of water. Downstream countries rely heavily on irrigated agriculture, while upstream countries seek to harness their hydroelectricity potential. Upstream countries prefer to store water during the summer for use in the winter, putting them in conflict with downstream countries' planting seasons. A Soviet-era arrangement, whereby upstream countries were supplied with oil and gas, was discontinued, setting the stage for the current impasse.

Climate Change and Natural Risks

There is growing evidence of climate change and its impacts on agriculture in Central Asia and the South Caucasus. Climate change may have unprecedented effects on the region's water resources (White et al. 2014), agricultural productivity (Sommer et al. 2013), and farm incomes (Bobojonov and Aw-Hassan 2014).

While the majority of principal agricultural zones in Central Asia and the South Caucasus are irrigated, they are threatened by droughts, especially in areas that depend on rainfall, such as northern Kazakhstan, where around four-fifths of the country's grain and oilseed crops are grown. The majority of the agricultural areas in Georgia and Azerbaijan are also reliant on rainwater, particularly in mountainous areas. Both South Caucasus countries are in an area susceptible to droughts. In the past 20 years, both have experienced drought episodes with widespread impacts on agriculture (Ahouissoussi et al. 2014b, Georgia and Azerbaijan).

[4] Water footprint refers to the volume of combined usage of rainfall, surface, and groundwater.

Given the region's wide topographic and climatic diversity, Central Asia and the South Caucasus are also prone to various natural disasters, including earthquakes, floods, avalanches, mudflows, landslides, and extreme weather events. The effects of these are likely to become more severe with climate change. Floods occur mostly in the southern and eastern parts of Kazakhstan due to heavy rainfall and snowmelt from the area's mountains (Broka et al. 2016b). Many of the Kyrgyz Republic's and Tajikistan's rural population reside near mountainous landscapes, making them vulnerable to recurring natural disasters. Natural disasters have caused an estimated annual average damage of $30 million in the Kyrgyz Republic (Broka et al. 2016a).

Large parts of Central Asian countries may face high or extremely high water risk levels (World Resources Institute). According to global warming prognoses by the Intergovernmental Panel on Climate Change, the glaciered river systems in Central Asia would experience unfavorable hydrological changes (Hagg et al. 2006; Siegfried et al. 2012). Projections suggest that by 2050, temperature increases of between 1.7°C and 4.7°C are expected (Milanova et al. 2018). Increased air temperature in Tajikistan has already significantly impacted water flows in the Vakhsh and Pyanj rivers (Chevallier et al. 2014). Specific forecasts already suggest that water flow may decrease by 2%–5% in the Syr Darya River basin and 10%–15% in the Amu Darya basin by 2050 (World Bank 2013), which would worsen water scarcity. In Uzbekistan, for example, irregular spring temperatures and precipitation would have significant effects on agricultural production, with climate change likely to cause yield reductions of 20%–50% by 2050 for nearly all crops under a business-as-usual scenario (World Bank 2013).

All four major agricultural regions of Azerbaijan would face increasing temperatures that are also unprecedented in the country's recent history. Over the next 5 decades, the average temperature increase is expected to be 2.4°C under moderate assumptions, compared to the 0.6°C increase observed from 1961 to 2000 (Ahouissoussi et al. 2014a, Azerbaijan). Moreover, the study projected that climate change impacts would be most pronounced from August to October, an important agricultural production period. Summer temperature increases may reach as high as 4°C in the country's southernmost subtropical agricultural region, and precipitation declines are projected to be greatest during the late spring to early autumn (Ahouissoussi et al. 2014a, Azerbaijan). The estimated impacts of climate change in Georgia were almost identical with increased precipitation in the western portion of the country (Ahouissoussi et al. 2014b, Georgia).

AFGHANISTAN AND PAKISTAN

Land and Water Resources

Afghanistan's arable land accounts for only about 12% of its total area. The country features mountainous terrain with little precipitation, making irrigation crucial to agriculture. As of 2019, Afghanistan's arable land of about 2 million ha is irrigated, 1 million less than the figure prior to the conflict. Nonetheless, Afghanistan still has the potential to irrigate 4.4 million ha (World Bank 2014). Official data report that the irrigated area is increasing by an average of around 89,000 ha per year since 2009 (WFP, UNEP, NEPA 2016).

Pakistan has diverse agroclimatic conditions, with its major agriculture-producing zones being supplied with water from the melting glaciers from several mountain ranges that include the Karakoram and Hindu Kush. Pakistan is also home to the world's largest earth-filled dam, which provides nearly a quarter of national electricity output (Malik et al. 2016). Eastern areas of the country receive precipitation throughout the summer monsoon season, which accounts for 60% of the country's annual precipitation. Most of the country is considered arid or semiarid, although areas that border the mountain ranges to the north receive substantially higher rates of precipitation (Chaudhry 2017).

Pakistan's major agricultural areas are in the Indus River basin, which by the 1980s covered around 70% of the country's 31 million ha of arable land (Pinckney 1989). The Indus River basin also hosts the world's largest gravity-fed irrigation system (Malik et al. 2016) that was constructed in the 19th century. Pakistan has invested heavily to expand its irrigated areas. The total irrigated area nearly doubled from 10.4 million to 20.6 million ha between 1960 and 2010 (Davies et al. 2016).

Climate Change and Natural Risks

Afghanistan faces similar climate change risks as Central Asia, mainly in the form of droughts and floods. A joint report by the World Food Programme, UN Environment Programme, and the National Environmental Protection Agency of Afghanistan identifies four climate hazards: (i) drought caused by a lack of spring rainfall, (ii) spring and summer drought caused by reduce snowmelt in upland areas, (iii) floods caused by localized heavy spring rainfall, and (iv) floods caused by increased snowmelt in highland areas.

These climate hazards are consistent with general projections seen in Central Asia, in which higher global temperatures will lead to uncertain weather patterns that will make precipitation more variable than evident today. Economic damage caused by drought has been estimated at $280 million, earthquakes at $80 million, and floods at $54 million (World Bank 2017a). Droughts are frequent in Afghanistan and expected to increase in the future due to the impact of climate change. Decreased spring rainfall has been recorded throughout the country's central and northern provinces that border Central Asia. In addition, reduced snowmelt in nearby mountains threatens irrigation water availability. Between 2000 and 2014, the number of snowfall days has generally decreased throughout the country. The most severe decreases have been observed in the far eastern Hindu Kush and Pamir mountain ranges, which are the sources of water for the country's northeast and parts of Central Asian irrigation systems (WFP, UNEP, NEPA 2016).

Pakistan has suffered severe weather-related disasters in recent years, including floods and droughts that have had serious consequences for agriculture in affected areas. Although Pakistan boasts a rich natural resource endowment for agriculture, water scarcity is a growing problem in arid and semiarid areas of the country. Roughly 80% of the country's total land area is classified as arid or semiarid and is vulnerable to desertification (United Nations Development Programme 2017). Pakistan ranks among the world's most water-stressed countries, along with nations mostly in the Middle East and Central Asia (Young et al. 2019).[5]

[5] Young et al. 2019 defined water stress based on the rate of withdrawal of total renewable water resources, i.e., higher rate of withdrawal of total renewable water resources means higher water stress.

The country is highly vulnerable to climate change, ranking 8th globally in terms of nations most affected by climate-related events from 1998 to 2017 according to Germanwatch's Global Climate Risk Index 2018. Pakistan incurred $3.8 billion worth of damage from climate change over that time frame (Eckstein et al. 2019). From 1961 to 2007, the annual mean temperature in Pakistan increased by 0.5°C. Under a moderate scenario, the annual mean temperature is projected to rise by 3°C–5°C by the end of the 21st century, with higher global emissions assumptions producing an even more extreme range of 4°C–6°C (Chaudhry 2017).

MONGOLIA AND THE PEOPLE'S REPUBLIC OF CHINA

Land and Water Resources

Mongolia's natural resources have been heavily exploited for agriculture and economic development since the 2000s. The arable area is 567,200 ha, around 0.5% of its total agricultural land area (FAO, FAOSTAT). Only 14% of the arable area is potentially irrigable (FAO, FAOSTAT). Moreover, pastureland has been decreasing due to population growth and land degradation (excessive grazing pressure on fragile pasture ecosystems). Around 70% of Mongolia's land faces desertification, with the figure likely to increase (Juskalian 2015; Zhang and Zhang 2017).

Mongolia's rivers and lakes also face serious problems. Around 551 of 6,646 rivers and streams are drying or have already dried, while 483 of 3,613 medium- and small-sized lakes and marshes have already dried (Zhang and Zhang 2017). National water policies have been implemented in response to these water resource issues, including the National Water Program, the National Program on Reduction of Natural Disasters, the National Action Plan on Climate Change, and the National Action Plan for Combating Desertification (Davaa 2008). The government has also encouraged the establishment of water protection organizations (FAO 2012b).

As with Mongolia, the PRC faces challenges in terms of the availability of water and land resources. Although the total water supply in the PRC is approximately 3.5 trillion cubic meters (m^3), the per capita water supply is only around 2,200 m^3, only 30% of the world average (Government of the People's Republic of China, Ministry of Water Resources 2016). Agriculture uses about two-thirds of total water resources (Government of the People's Republic of China, Ministry of Water Resources 2014), and the sector's water use efficiency is low due to inefficient irrigation systems and misallocation of resources among crops. For example, water usage for 1 kilogram of grain in the PRC is twice that in developed countries (Wang 2017). Per capita arable land is only 0.1 ha, which is around 40% of the world average. Additionally, land and water resources are unevenly distributed throughout the country. The south of the country has sufficient water but has inadequate land, while the reverse is true for the north (Zhou 2000, World Bank, World Integrated Trade Solution).

The PRC faces problems of water pollution, aside from the physical availability of land and water resources. Agriculture is one of the main sources of water pollution because of the excessive use of fertilizers and pesticides (Qu et al. 2011; Li et al. 2015). Pesticide usage per ha is two to three times higher than recommended and has impacted on the quality of groundwater sources (Zhen et al. 2005; Sun et al. 2012). The Government of the People's Republic of China, Ministry of Ecology and Environment has recommended policies to reduce water pollution from agrochemical applications (Yu and Wu 2018).

Climate Change and Natural Risks

Climate change is a contributing factor to increased desertification, occurrences of extreme weather events, and land degradation in Mongolia. Greenhouse gas emission in Mongolia was measured at 7.1 metric tons per capita in 2014, which is 29.6% higher than the world average (World Bank, World Integrated Trade Solution). High per capita emissions are mainly caused by intensive and resource-extractive activities (e.g., forest fires, mining activities, illegal logging, and forest disease), agriculture (primarily livestock production), and energy (e.g., coal-fired electricity and heat generation) (United States Agency for International Development [USAID] 2016). Although policy standards and measures have been launched for environmental protection and sustainable development, there is still a lack of proper governance to monitor the implementation of environmental laws or standards in Mongolia (FAO 2012b).

Climate change may have severe adverse impacts on agricultural production in the PRC. Cereal yields in 2050 may fall by 15%–25% compared with 2000 levels because of climate change (Chew and Soccio 2016). Meanwhile, the PRC's agriculture sector may be responsible for severe damage to the environment and, to some extent, the worsening of climate. The development of agriculture during the past decades was mainly based on intensive land and water use, as well as the high usage of fertilizers (Government of the People's Republic of China, Ministry of Environmental Protection 2014). Although agricultural production and farmers' incomes increased, the rapid agricultural intensification has resulted in pollution, high greenhouse gas emissions, land degradation, water erosion, and loss of biodiversity (Khan et al. 2009; Shen et al. 2013). The PRC's 13th Five-Year Plan (2016–2020) highlights sustainable development by setting targets for expanding environmental protection, increasing energy efficiency, improving access to education and healthcare, and enhancing social protection (Yu and Wu 2018).

IV AGRICULTURAL POLICY FRAMEWORKS AND STRATEGIES

CENTRAL ASIA AND THE SOUTH CAUCASUS

The agriculture sectors of Central Asia and the South Caucasus underwent a sustained process of transition and reform since the early years of independence. These reforms transformed the fundamental institutional structures of agriculture with new production patterns.

Policy Context

Countries in Central Asia and the South Caucasus shared a common framework for agricultural development that was heavily influenced by policies under the former Soviet Union, relying on subsidies, specialization, and centrally-planned markets. The dissolution of the Soviet Union severely impacted all aspects of agriculture in its immediate aftermath, as market institutions that provided essential functions (that were then under state supervision) were removed. Moreover, the construction of new national barriers posed an obstacle to the production and marketing of agricultural inputs and goods. The cumulative effect of these changes was a sharp decline in output throughout the region, with widespread socioeconomic ramifications.

It was under these circumstances that initial reforms were pursued. As the inefficiencies of institutions became apparent, these institutions were the focal point for policy reform. Key list of issues that needed to be addressed included land reform, farm reorganization (ownership), irrigation and water management, price reform, and the development of market institutions (Rozelle and Swinnen 2004). Reform efforts in the immediate transition period were largely focused on price liberalization, which every country in the region instituted for most goods. The destabilizing effects of price liberalization included sustained periods of hyperinflation, which was experienced by almost all countries in the region. Kazakhstan, for instance, recorded increases in its consumer price index of over 1,000% from 1992 to 1994.

After price liberalization, land reform was one of the most visible and far-reaching elements of agricultural reform in the region (Lerman et al. 2004). Under the Soviet system, all land was owned by the state and all agricultural land fell under the purview of state-run or state-supported collective farms. Small-scale reforms during the Soviet era allowed individuals user rights for land to grow crops for subsistence on small household plots, but full ownership rights with associated privileges were not accorded. State land control is one of the main reasons for inefficiencies in Soviet agriculture (Lerman et al. 2004). Individual farmers who worked on state lands had little incentive to make long-term investments, as production decisions were made with the primary purpose of satisfying official mandates, with only a passing regard to efficiency.

While all governments in the region generally acknowledged the weaknesses of the collective farming system, they offered widely differing solutions to land reform. The countries of Central Asia and the South Caucasus demonstrated a more conservative approach in general than those in Central and Eastern Europe, which moved quickly to allow full ownership rights, including the right to sell or transfer land. Among Central Asia and the South Caucasus countries, privatization was undertaken most rapidly in the Kyrgyz Republic, Azerbaijan, and Georgia and more slowly in Tajikistan, Turkmenistan, and Uzbekistan. Meanwhile, Kazakhstan gradually introduced the concept of private ownership of agricultural land after 2000 (Petrick et al. 2014). The Kyrgyz Republic introduced private ownership in 1998, simultaneously imposing a moratorium on land transactions to prevent landowners from selling their assets before fully understanding their rights (USAID 2005). Today, land in Tajikistan and Uzbekistan continues to be state-owned, although agricultural producers can claim user rights.

Along with land reform, farm reorganization was another policy priority for countries during the early transition period. Countries in the region have acknowledged the weaknesses of collective farming, which included inefficiencies caused by soft budget constraints, excessively large plots, labor immobility, and centrally-directed production decisions (Lerman et al. 2004). Accordingly, initial reforms throughout Central Asia and the South Caucasus sought to abolish collective farming. However, the speed and success of decollectivization varied by country, reflecting the difficulties in establishing replacement institutions.

Farm reorganization in Central Asia resulted in the creation of three forms of farming units: agricultural enterprises, individual farming, and household plots.[6] Agricultural enterprises—which were variedly known as joint stock companies, production cooperatives, or corporate farms (depending on the country)—largely resembled the old collective farms. Individual farming arose from the redistribution of collective farms to private individuals. Household plots are small plots that originated from the Soviet era, which continued to exhibit satisfactory performance during the transition period and assumed an important role in livestock and horticultural production despite their comparatively small land areas.

Changes in Land Use

There were two major periods of agricultural development in Central Asia: a period of sharp decline from the early 1990s and a subsequent recovery phase initiated by reforms in the mid- to late 1990s (Lerman and Sedik 2009). With some variation, this pattern generally held true for all Central Asian countries during the first decade of independence. Most countries in the region experienced a windfall in productivity during the late 1990s and early 2000s, which may be viewed as a one-time effect of land reform and farm restructuring.

[6] Nomenclature varied depending on the country, but most of the farming organizations that emerged during this period fell under these three categories.

Over the long term, land reform effectively redistributed agricultural land from large enterprises to smaller farms. For example, in the Kyrgyz Republic, land controlled by collective farms and large agricultural enterprises dropped dramatically from 93% of total cropland in 1990 to 26% in 2000 and less than 5% in the mid-2010s (Government of the Kyrgyz Republic, National Statistics Committee). As of 2009, more than 300,000 individual farms with an average land size of 2.9 ha control about 82% of total cropland in the country. The remaining 18% of total cropland is occupied by more than 900,000 traditional household plots with an average size of 0.11 ha per holding.[7] Overall cropland in the Kyrgyz Republic saw an increase of more than 40% between 1990 and 2000 despite a subsequent reduction of more than 104,000 ha since this early period. In Tajikistan, land reform and farm reorganization accelerated after the end of the civil war (1992–1997). Currently, large agricultural enterprises occupy only 14% of arable land, compared with 21% under household plots and 65% under private farms (Government of Tajikistan, Statistical Agency under President of the Republic of Tajikistan).

Azerbaijan introduced land reform relatively early compared to the rest of the region, with 850,000 rural households occupying 1.3 million ha redistributed from legacy state and collective farms. They accounted for over 90% of agricultural output by the mid-2010s (Ahouissoussi et al. 2014a, Azerbaijan). Land sizes are similarly small in Georgia and primarily used to grow crops for household consumption (FAO 2012a).

Large agricultural enterprises using leased state land and hired labor are still major actors in agricultural production in Kazakhstan, especially in its northern grain-producing regions, in contrast to the Kyrgyz Republic, Tajikistan, Azerbaijan, and Georgia (Petrick et al. 2014). Approximately 60% of arable land is cultivated by these enterprises, compared to 39% of arable land for private farms and only 1% for household plots (Government of Kazakhstan, Statistical Committee under the Ministry of National Economy 2018).

Changes in Agricultural Production

Agricultural production and crop choices in the region have since turned in favor of food and high-value commodities since the early reform period. In the past, the Kyrgyz Republic specialized in intensive livestock production, Tajikistan and Uzbekistan in cotton, and Kazakhstan in wheat. Other essential food products, including processed foods, were obtained from countries outside of Central Asia.

Changes in the distribution of arable land and livestock across farm types characterized a fundamental transformation in Central Asian agricultural production. In all countries, the share of private farms (comprised of household plots and individual farms) in total agricultural production increased substantially. The private sector produced more than 95% of aggregate agricultural output in the Kyrgyz Republic and Uzbekistan, including almost 95% of crops and nearly all livestock by the late 2000s (Akramov and Omuraliev 2009). While the production of staple crops (primarily cereals) was deemed strategically important and remained the target of state intervention, horticulture and livestock have generally been left to the management by private and household farmers and prevailing market forces.

[7] Partially based on Akramov and Omuraliev (2009) with updated information.

Since 1990, wheat areas in the Kyrgyz Republic declined from 42% to 24% in 2018, as land was allocated for other crops (including horticultural crops) and wheat availability became less of a concern due to improved trade with Kazakhstan (Government of the Kyrgyz Republic, National Statistics Committee). Land allocated for fruit (e.g., melons) and vegetables (particularly potatoes) in Tajikistan also increased after initial reforms at the expense of cotton and feed crops, i.e., land area under fruit increased by 16% and vegetables 30% by 2011, compared with their 2005 figures (Akramov and Shreedhar 2012). In Uzbekistan, land allocated for horticultural crops has been steadily increasing, reaching almost 17% in 2016, which represented a nearly 5 percentage-point increase from the early 2000 figure. Kazakhstan's strategy of using direct subsidies has encouraged farmers to diversify their cropping mix by planting less wheat and directing subsidies to feed and oilseed crops such as sunflowers, flax, safflower, rapeseed, and soybean. In Azerbaijan, since the completion of its land reform in 2002, the land area planted to cereals has remained steady as wheat production remained subsidized by the state and production and harvested area for fruit have steadily increased. In Georgia, the private sector quickly assumed control of livestock and horticulture production in response to the government land reform program that started in 1992. However, due to land fragmentation and political instability, Georgia's agriculture sector did not experience the kind of recovery seen elsewhere in the region.

Changes in Land and Labor Productivity

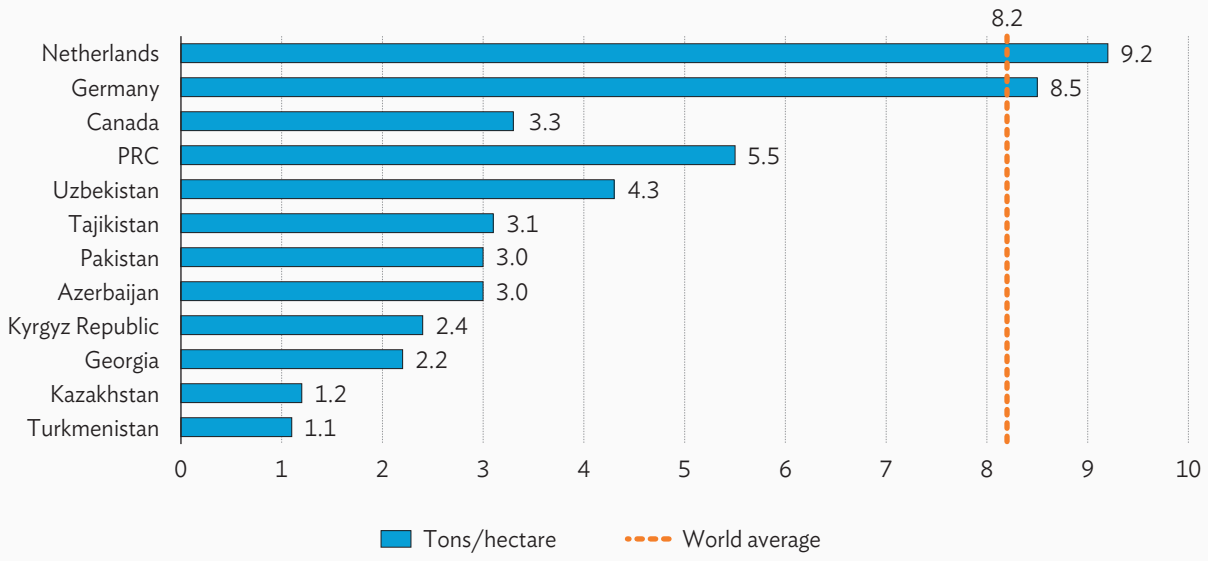
Higher farm productivity in smallholder farms was due to lower transaction and administrative costs, better governance, and efficiencies driven by individual (private) crop choices. On the other hand, larger farms suffered the costly administrative burdens of monitoring operations and enforcing labor discipline that outweighed the gains from larger scaled operations (Lerman et al. 2004).

The reorganization of farms, which began in the mid- to late 1990s, strongly influenced the flow of labor to and from the agriculture sector. In some countries, this period was marked by an influx of urban dwellers who went into agriculture following independence with little farming experience. Moreover, some countries had higher rates of rural migration from overseas that were not accurately accounted for in official data.

The Kyrgyz Republic and Uzbekistan both experienced relatively early rebounds in land and labor productivity in the mid-1990s. However, the pace of increase was much faster in Uzbekistan than the Kyrgyz Republic. Land and labor productivity rebounded in Kazakhstan, Turkmenistan, and Tajikistan in the late 1990s. But land productivity growth in Kazakhstan has remained sluggish.

The region's wheat productivity remained far below the world average of 8.2 tons/ha in 2017 (Figure 13). Uzbekistan, the top wheat producer in the region, achieved 4.3 tons/ha. Lower productivity levels were recorded in Turkmenistan at 1.1 tons/ha. On the other hand, vegetable productivity in the region (especially those of Tajikistan, Uzbekistan, and Turkmenistan) was significantly higher than the world average (28.9 tons/ha). Tajikistan reports vegetable productivity of 57.7 tons/ha, Uzbekistan 43.1 tons/ha, and Turkmenistan 42.1 tons/ha (Figure 14). Vegetable productivity in Azerbaijan (11.8 tons/ha) and Georgia (3.2 tons/ha) were far below the world average.

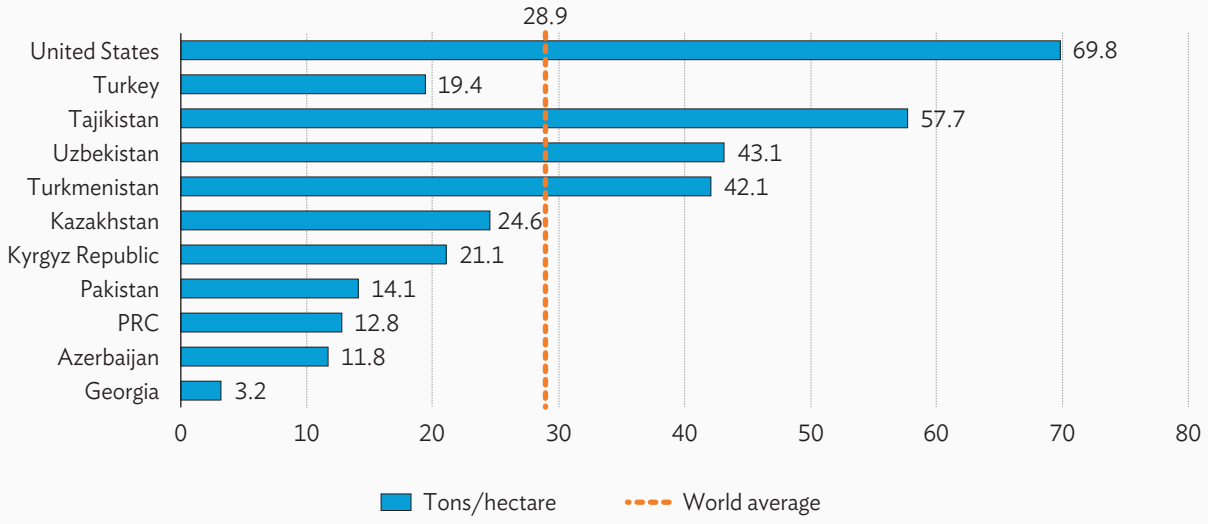
Figure 13: Productivity of Wheat, 2017



PRC = People's Republic of China.

Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Figure 14: Productivity of Fresh Vegetables, 2017



PRC = People's Republic of China.

Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Current National Agricultural Strategies

Initial reforms in the 1990s helped launch agricultural recovery for most countries in the region. Recognizing the importance of agriculture for household welfare and macroeconomic stability, governments have sought to close the productivity gap between agriculture and other sectors. In the years that followed independence, regional policies focused on the relatively productive energy and mineral resources as a means to achieve economic stability, growth, and export earnings. Meanwhile, a large share of the labor force continued to be engaged in the agriculture sector, which was undergoing a sweeping transformation.

Among the most common items incorporated into national development strategies in the region to improve agricultural productivity included (i) agricultural diversification, (ii) rehabilitation of irrigation systems, (iii) targeted use of subsidies, and (iv) implementation of land use policies. The emphasis on agricultural diversification in recent years is in contrast with Soviet-era and post-independence state policies that emphasized staple food sufficiency or production of traditional crops such as cotton. Almost all of the countries in the region increased grain production during the 1990s and early 2000s as a response to food supply shocks and the breakdown of trade networks after independence. Agricultural diversification in countries with warmer climates and high labor-to-land ratios focused on horticultural production, which tends to be labor-intensive as in the case of Azerbaijan, southern Kazakhstan, the Kyrgyz Republic, Tajikistan, and Uzbekistan. Georgia, Tajikistan, and Turkmenistan sought improvements to irrigation systems and rural infrastructure.

In recent years, agricultural policies have focused more on supply and value chains to counteract institutional and logistic gaps that were consequent upon the sector's transformation. Agricultural policies on supply and value chains emphasize (i) improving national food processing capacity as a means of adding value, (ii) extending trade range, and (iii) reducing reliance on imports of basic foodstuffs. Likewise, increasing the number of storage facilities addresses the infrastructure shortage faced by many of the region's small farmers.

The development of trade and logistics centers are mentioned in the national strategies of Azerbaijan, the Kyrgyz Republic, and Uzbekistan. In Uzbekistan, the promotion of agricultural clusters is under consideration, i.e., whether clusters can deliver growth and increase export power while encouraging the wide participation of the country's small farmers is under debate. Moreover, countries that pursued export expansion strategies have had to double efforts to develop their national food safety and regulatory standards. While not all national agricultural policies articulate this goal, motivation to improve product standards has often been driven by tangible opportunities to export to new markets, such as in the case of the Kyrgyz Republic in its bid to join the EEU or other Central Asian countries seeking to export to the PRC and the Middle East.

Because the region's agriculture sectors face real constraints in terms of land and water resources, it is not surprising that their national agricultural policies also call for the promotion of environmental sustainability. This is included in the national agricultural policies of Azerbaijan, the Kyrgyz Republic, and Uzbekistan. Moreover, sustainable agricultural production is outlined in other national environmental policies.

Land degradation and sustainable use of water resources are other aspects of environmentally focused agriculture that are common to many national agricultural policy documents.

Agricultural policies have also sought to fill research and extension gaps created during the region's transformation to a smallholder-dominated production system. Policies included (i) support for research, development, and technology adoption; (ii) improvement of agricultural extension and veterinary services; (iii) expansion of agricultural finance options; and (iv) strengthening of agricultural institutions. Supporting domestic research and development has been written into the strategies of Kazakhstan, Tajikistan, and Uzbekistan.

AFGHANISTAN AND PAKISTAN

Policy Context

National agricultural policies in Afghanistan and Pakistan are similar to those of other CAREC countries as regards their goals to improve agricultural productivity, but they operate under vastly different environments. South Asian countries are much larger in terms of population than the countries to their north and represent one of the large economic markets that border the Central Asian region. Pakistan, a country with a population of over 200 million, is larger than Central Asia and the South Caucasus combined and ranks among the world's leading producers of various types of agricultural goods. Interaction, however, between South Asia and Central Asia has been limited, although diplomatic ties between the two regions have been improving.

Afghanistan faces unique challenges that stemmed from decades of conflict, which left much of the agricultural infrastructure either destroyed or underdeveloped. Afghanistan was a major agricultural producer until the 1970s, even leading the world in raisin production (Leao et al. 2018). It was self-sufficient in wheat production (World Bank 2014) prior to the years of conflict, while in livestock and horticulture Afghanistan was a key exporter of various perennial tree crop products.

Changes in Land Use and Agricultural Production

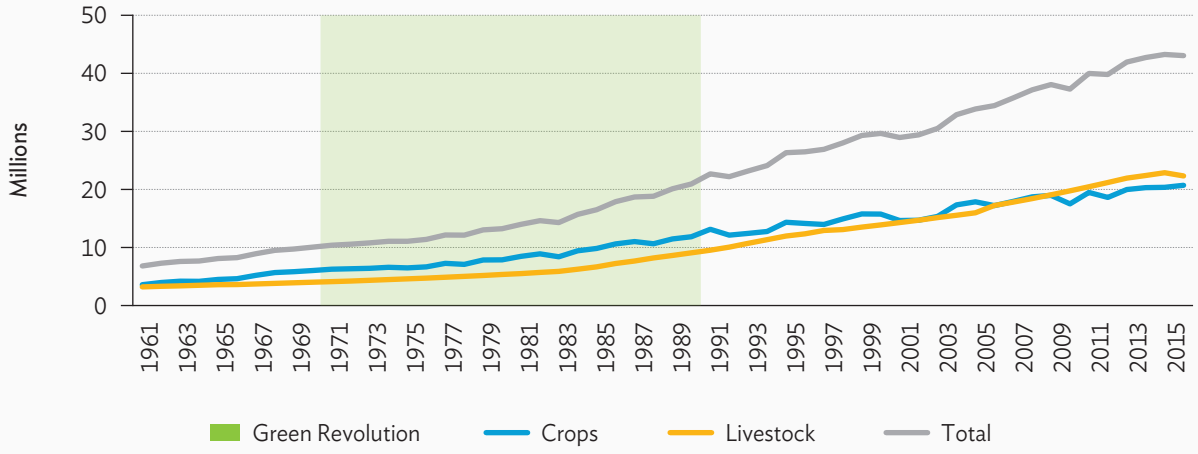
Afghanistan's national land policy has been undermined by an unstable security situation and exists under an uncertain legal environment. The 2004 Constitution of Afghanistan, the 2007 Land Policy, and the 2008 Law on Managing Land Affairs were founding documents that established the country's current land rights policy framework. While the 2007 Land Policy was designed to define a legal framework for land rights, implementation of the policy has faced some hurdles, not the least of which was the simultaneous existence of customary land laws in rural areas. Successive ruling groups since the 1970s have sought to address land issues, starting with the communist government to Taliban rule in the 1990s and 2000s to the current government. De facto land distribution occurred in the 1990s, as wealthy landowners abandoned or redistributed their land. However, land was informally amassed by armed militias during periods of open conflict, such as after the fall of the Taliban government (USAID 2018).

Despite the introduction of a legal framework for land use during the mid-2000s, Afghanistan has continued to be plagued by serious problems because of conflict. Land grabbing and informal development on land occurred frequently and were committed by various actors, including households that returned from abroad, armed groups, and the local elite (USAID 2018). Over 5 million Afghan refugees have returned to the country since 2003 and created additional pressures on land distribution. The 2008 Law on Managing Land Affairs outlined land ownership concepts that allowed full rights over private land with arrangements with the Ministry of Agriculture, Irrigation and Livestock. This policy permitted land leasing for agricultural purposes for up to 50 years for fertile land and 90 years for previously uncultivated land (Government of Afghanistan, Ministry of Justice 2008).

Modern land reform in Pakistan was implemented in three stages in 1959, 1992, and 1977. The purpose of these reforms was to redistribute land from large landowners to smallholders, tenants, and landless farmers. However, land redistribution was largely unsuccessful (Malik et al. 2016). To this day, large landowners claim a wide range of legal mechanisms to protect their holdings, undermining national- and donor-driven efforts to institute privatization and land reforms (Young et al. 2019). Land ownership in Pakistan is out of reach for many small farmers, who resorted to various forms of tenant farming. In 2010, these arrangements constituted over a quarter of the total cultivated land (Malik et al. 2016).

Pakistan's agricultural profile shifted focus from crop to livestock production during 2002 (Figure 15). Growth rates in the livestock sector have outpaced that of crop production since the 1990s (Spielman et al. 2016). In 1980 (roughly coinciding with the middle of the Green Revolution), the crop subsector represented 60% of total agricultural production, compared with 48% in 2010–2011. Meanwhile, the livestock sector's share increased from 40% to 52% over the same period.

Figure 15: Structural Transformation of Pakistan's Agriculture Sector, Value of Production in $, 1960–2016



Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

National Agricultural Strategies

Afghanistan's National Agricultural Development Framework (NADF) outlines the country's short- and long-term agricultural development policies aimed to increase agricultural production and infrastructure (Government of Afghanistan, Ministry of Agriculture, Irrigation and Livestock). The strategy was designed to move Afghanistan closer to self-sufficiency in field crops and expand the growth of cash crops to meet local and export demand.

Under the Agriculture Production and Productivity Program, Afghanistan sought to draw attention to several subsectors including cereals, industrial crops, horticulture, livestock, and nomadic agriculture ("Kuchi Support" subprogram). The NADF also mentions lucrative export opportunities in nearby markets such as India as a motivation for improving the quality of its agricultural production (Government of Afghanistan, Ministry of Agriculture, Irrigation and Livestock). Subsequent support strategies and laws have been designed in support of NADF.

In recent years, Pakistan has outlined its agricultural development strategies through a series of policy documents including the 11th Five-Year Plan (2013–2018), the Agriculture and Food Security Policy (2013), the National Agriculture and Food Security Action Plan (2015), the National Zero Hunger Action Plan (2012–2017), and the Framework for the Implementation of Climate Change Policy (2014–2030). These various plans are consistent with Pakistan's "Vision 2025" that aims to transform Pakistan into an upper middle-income country by 2025. The 11th Five-Year Plan aimed to improve the productivity and profitability of the agriculture sector under sustainable conditions, taking national food security and poverty considerations into account. Linking agricultural production with food security is a common thread among these plans, and many of the specific interventions outlined aimed to support smallholder farming through multiple channels, such as providing disaster relief, increasing market access, implementing social safety nets, promoting dietary diversification, and monitoring food commodity prices (FAO 2016).

MONGOLIA

Policy Context

Mongolia introduced reforms after the establishment of its new constitution in 1992. Agricultural land reform was fundamental in the national economy as well as in the government's goal of promoting stable and sustainable economic growth (Hanstad and Duncan 2001). Before 1991, agricultural land belonged to the state, while individuals were permitted to grow subsistence crops in household plots thereon. The previous policy stipulated that no agricultural land was to be sold or transferred to individuals. The new land law adopted in 1994 provided individuals with expanded land rights, including limited ownership, possession (renewable leases between 15 and 60 years), and usage for foreigners (Myadar 2009). Private landholders were allowed to lease but not sell user rights, while user right holders could neither lease nor sell these rights. The law classified different land types, including (i) land for agriculture, (ii) urban areas and settlements, (iii) public infrastructure, (iv) forests,

(v) water resources, and (vi) reserves (Hanstad and Duncan 2001). The Land Law was amended in 2002 to further clarify state-owned land possession and land use as well as other related issues. Different forms of land tenure were allowed according to the amended law (Myers and Hetz 2004).

Changes in Land Use and Agricultural Production

Mongolia's agricultural development experienced a two-phase transition: (i) a period of recession in the early 1990s following the collapse of the Soviet Union, and (ii) a recovery and growth phase initiated by agricultural reforms in the early 2000s (Cheng 2003). In general, the total agricultural land area has decreased from 140 million ha in 1961 to 110 million ha in 2016 (FAO, FAOSTAT). The cropped area increased from 624,000 ha in 1960 to 1,369,000 ha in 1991, then declined to 572,200 ha in 2016. In 1961, permanent pastures and meadows covered over 140 million ha, but by 1991, this had fallen to 124 million ha, and to 110 million ha by 2016 (FAO, FAOSTAT).

Prior to 1990, Mongolia was self-sufficient in agricultural commodities for domestic consumption and exported certain products such as meat, animal fibers, skins, together with some traditional processed dairy products (from yaks, camels, and horses). Despite the collapse of agricultural support systems during the economic transition (Myadar 2009; Hanstad and Duncan 2001), crop and livestock production increased gradually from 1991 to 2003 but experienced a notable drop in 2003 due to successive *dzuds* (severe winter conditions). Since then, production improved significantly until 2011 and had gradual decreases thereafter (FAO, FAOSTAT).

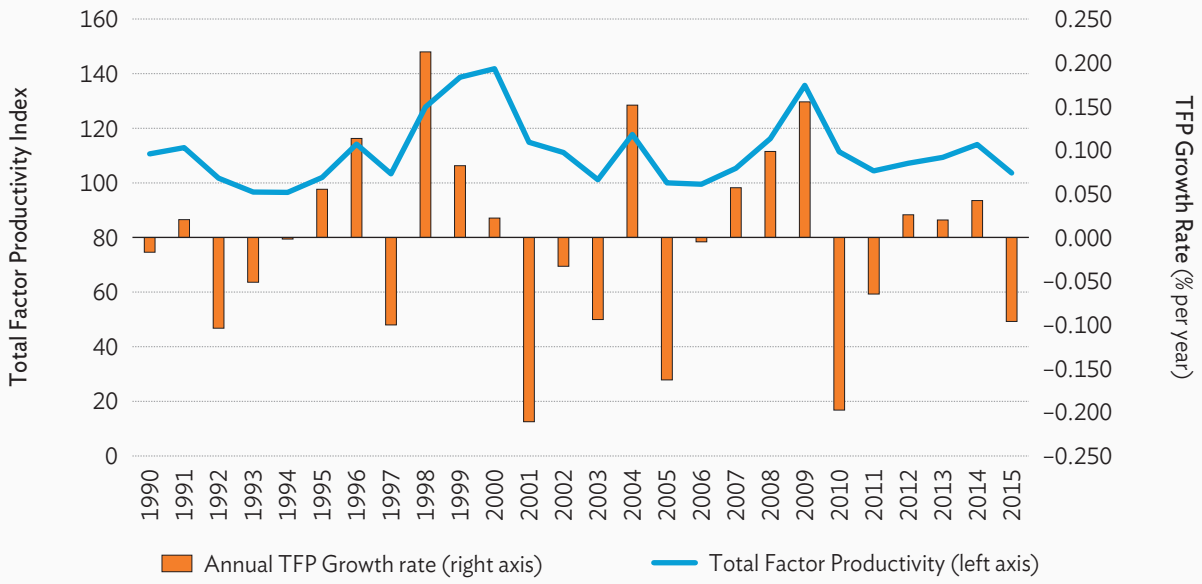
Changes in Productivity

Mongolia's agricultural productivity has fluctuated greatly since 1990. Total factor productivity—the increase in output not attributable to increases in input utilization—fluctuated widely as shown in Figure 16 (USDA, Economic Research Service). Decreasing productivity in 2000–2003 and 2009–2011 is consistent with the production declines during these periods mainly because of harsh weather and natural disasters. On the other hand, recent labor productivity has demonstrated a positive trend.

National Agricultural Strategies

The Comprehensive National Development Strategy of Mongolia defined its strategic goals for food, agriculture, regional and rural development, as well as its environmental policies. The main strategy document for the food and agricultural development is outlined in the National Program for Food Security (2009–2016), which aimed to ensure a sustainable supply of nutritious, safe, and accessible food as well as to improve population health and agriculture labor productivity (FAO 2012b). The Mongolian Livestock National Program aimed to develop a viable and competitive livestock sector for domestic self-sufficiency and export opportunities.

Figure 16: Total Factor Productivity and Annual Growth Rate, Mongolia, 1990–2015, Indexed to 2005



TFP = total factor productivity.

Source: United States Department of Agriculture, Economic Research Service. International Agricultural Productivity. *Agricultural Total Factor Productivity Growth Indices for Individual Countries, 1961–2016.* https://www.ers.usda.gov/data-products/international-agricultural-productivity/ (accessed 31 October 2019).

In addition to these programs, the Mongolian government continued the Third Reclamation Campaign of crop development to promote vegetable and fruit production through supporting crop production in the eastern and western regions. Since Mongolia also faces many environmental issues including desertification, land degradation, water limitation, water pollution, and air pollution (Lindberg 2017), it introduced a series of policy actions that address environmental protection, designation of nature reserve areas, investment in energy-efficient technologies, and pollution reduction programs (FAO 2012b).

PEOPLE'S REPUBLIC OF CHINA

Policy Context

Since 1949, agricultural development in the PRC can be described as mercurial, marked by sustained periods of rapid growth and decline. Two phases of land reform have influenced the PRC's agriculture and rural development. During the first phase (1949–1978), land was redistributed to rural households. In 1958, farmers were forced to join communal farms under centrally-controlled production plans and procurement systems (Lin 1990). However, agricultural production remained poor during this period, with increases averaging less than 300 kilograms per capita. Meanwhile, per capita production of cotton and oilseed decreased by 11.3% and 16.5%, respectively (Du 2006).

In the second phase (1978–1984), the PRC initiated the Household Responsibility System for agricultural development. Agricultural land was placed under the ownership of rural collectives, while households became eligible to enter a 15-year contract enabling user rights for farmland. During this period, agricultural productivity and output increased, while the price of rice, wheat, and maize decreased, thereby supplying the market with cheap food products (Zhong et al. 2018). By 1983, almost all arable land had been allocated to rural households (World Bank and Development Research Center of the State Council of the PRC 2014).

Rural land reform continued after the introduction of the land policies that aimed to improve land use efficiency, rationalize land allocation, improve land management, and coordinate urban and rural policies World Bank and Development Research Center of the State Council of the PRC 2014. Important land reforms included policies on rural land tenure and land transfer. Granting of land contract rights largely began in the mid-1980s and ended in 1997, when rights were extended for a second 30-year period ending in 2027.[8] The government also encouraged the transfer of land use rights to allow enterprises to scale up production and facilitate higher agricultural productivity through mechanization (Kim 2018).

In addition to land reform, price support measures were also implemented by the government to support agricultural development. The country introduced a state monopoly on major agricultural products in 1953, designating the government as the only legal purchaser of key commodities such as rice, wheat, maize, oilseeds, and cotton (Bruce and Li 2009). With the introduction of the Household Responsibility System in 1979, the government initiated the eventual transition to market liberalization in 1985. Accession into the WTO was a milestone for the PRC's agricultural development with liberated tax and subsidy policies as major initiatives. Price support measures were implemented in 2014, whereby state-owned grain reserve corporations made intervening purchases if prices fell below a certain level (Zhong et al. 2018; Organisation for Economic Co-operation and Development [OECD] 2018). While price support measures have encouraged higher production, they also made domestic food products more expensive relative to imported ones (OECD 2018).

Changes in Land Use and Agricultural Production

Crop and livestock production have expanded since 1978 owing to policy reforms and improvements in technology, machinery, and input availability (Huang and Rozelle 2018). Crop production increased from 567 million tons in 1978 to 1.8 billion tons in 2013, with an annual growth rate of 3.4%. Meanwhile, livestock production increased from 226 million tons to 1.3 billion tons, with an annual growth rate of 5.2% over the same period (FAO, FAOSTAT). Currently, the PRC is among the world's largest producers of agricultural products such as pork, rice, fruit (e.g., apples, grapes, tangerines, and pears), and vegetables. It is the world's second-largest producer of poultry, wheat, and corn (Chew and Soccio 2016).

[8] In 2017, the government announced that the duration of land contract rights would continue for 30 years after 2027 (Zhong et al. 2018; The National People's Congress of the People's Republic of China 2019).

In terms of its gross value of production, around 70% was derived from the cropping sector, compared with 30% from livestock in 2016 (FAO, FAOSTAT). The value of production of meat increased from 26% to 37% of the total agricultural value of production from 1991 to 2015 and drove the increase in demand for meat that was consequent on the country's rapid economic growth. The contribution of labor-intensive products such as fruit and vegetables increased by factors of 2.7 and 1.4, respectively, since 1995. Meanwhile, the share of land-intensive products such as rice, cotton, and wheat declined over the same period (FAO, FAOSTAT).

National Agricultural Policies

Although the initial development concern was to increase agricultural output, policy focus has since evolved to include (i) achieving food security and safety, (ii) increasing farmers' income, (iii) enhancing agricultural competitiveness, and (iv) promoting sustainable agricultural development. For example, whereas the PRC had emphasized grain self-sufficiency for food security during the early stages of its policy reform, a more recent strategy introduced in 2014 called for the utilization of both domestic and international resources and markets to secure domestic food supply (OECD 2018).

The PRC launched the National Strategy on Rural Revitalization (2018–2022) in 2018 to support agricultural and rural development and poverty reduction. The strategy pledged support for family and smallholder farms (Government of the People's Republic of China, Ministry of Agriculture and Rural Affairs 2018) and emphasized the importance of sustainability, inclusive growth, and environmental sustainability in agricultural development (Huang and Rozelle 2018). The issuance of the "No. 1 Central Document" in 2019 cemented the PRC's commitment to ensuring agricultural and rural modernization, food sufficiency, and farmers' capacity development (Government of the People's Republic of China, Ministry of Agriculture and Rural Affairs 2019).

CONCLUSIONS AND RECOMMENDATIONS

As of 2019, agriculture in the CAREC region has undergone an extensive series of policy, institutional, and structural changes. For the countries of Central Asia and the South Caucasus, Mongolia, and the PRC, agricultural development has largely consisted of managing the transition from a socialist legacy to a market-oriented system. Agricultural development followed different paths for Pakistan, whose government has overseen a series of national policies since the nation's founding in 1947, and Afghanistan, which suffered decades of war and existed for prolonged periods without a functioning central government. While agricultural systems of countries in the CAREC region are too diverse to suggest a one-size-fits-all strategy, some common threads appear when considering avenues for further growth.

Agricultural development policy focuses on the improvement of capacities of small farmers throughout the region. Smallholder farming is an important engine for agricultural development and a crucial employer of the CAREC region's large rural population. A primary and immediate need is to establish systems that allow farmers to access modern technology, technical know-how, and production inputs to promote productivity growth. While the rise of small-scale and fragmented farms helped trigger agricultural recovery in the late 1990s, this was widely considered a one-time gain whose effects cannot be replicated. Small-scale farming discouraged long-term investment in physical farm infrastructure and equipment and environmental conservation.

Investment in public goods, such as water, energy, and road infrastructure, can provide the kind of support that would aid household farmers and farm businesses of all types. Because most of the CAREC countries occupy arid or semiarid land surrounded by challenging terrain, investing in irrigation systems and transportation infrastructure must be key elements of agricultural policy. Investing in public infrastructure must also focus on improving governance and the institutions that manage irrigation resources, road networks, and border points. The public sector will play a crucial role in attracting investment and generating funds for infrastructure projects and should work in tandem with stakeholders to maximize their benefits. Moreover, regional governments can facilitate the cross-border exchange of expertise in developing infrastructure.

Improvements in agricultural infrastructure should be considered in the broader context and incorporate the development of support structures for trade, such as storage and logistics facilities. Many of the CAREC countries have the potential to become global exporters of certain agricultural products but are constrained by the lack of facilities that would sustain export activities. Creating not only the physical infrastructure but also the accompanying institutional and regulatory frameworks will help regional agricultural products gain access to lucrative markets that are relatively close by including East Asia, South Asia, the Middle East, and Europe. Improving veterinary services, sanitary and phytosanitary (SPS) inspections, and certification services would help increase foreign trade in meat and animal products.

Given their disparate histories and obstacles posed by geopolitical realities, efforts to harness the aggregated capacity of the CAREC countries have been limited. This may explain the relative dearth of trade and exchange between the various CAREC regions. In recent years, national agricultural policies have begun to consider constraints on growth, with an eye toward taking advantage of economic and trade opportunities. Coordinating these strategies as part of an international CAREC approach could motivate national policy makers to face shared challenges and derive ideas from collective expertise. Evidence-based research, sound data, and information exchange must underpin these efforts.

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APPENDIX
COUNTRY PROFILES

AFGHANISTAN

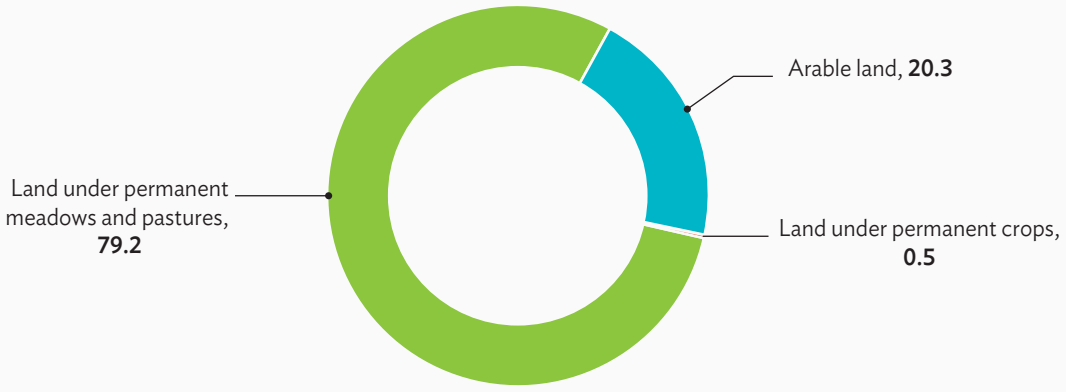
With a total population of 37 million (of which 27 million or 73% live in rural areas), Afghanistan is a mountainous, landlocked country bordered by Pakistan to the south and east; Iran to the west; Turkmenistan, Uzbekistan, and Tajikistan to the north; and the People's Republic of China (PRC) in the far northeast. The agriculture sector contributes a significant proportion of the national income but faces numerous challenges because of its natural resource endowment, particularly water. Alongside political turmoil, the environmental condition of Afghanistan has imposed major hurdles to its economic growth and has left it vulnerable to economic shocks. This condition underscores the need for policy interventions that could spur sustainable development in Afghanistan's agriculture and natural resource sector.

Resource Endowment and Input Usage

Land Resources

As of 2016, roughly 58% or 38 million hectares (ha) of Afghanistan's land is utilized for agriculture. Of this agricultural area, around 20% (7.7 million ha) is arable, 79% (30 million ha) is classified as permanent meadow and pasture, and 0.5% (181,000 ha) is categorized as permanent (perennial) or plantation crops (Figure A.1). Crops produced in Afghanistan include cereals (88.5% of the cropped area), horticulture (7.2%), fiber (0.9%), oilseeds (0.2%), and other crops (3.2%), as shown in Figure A.2.

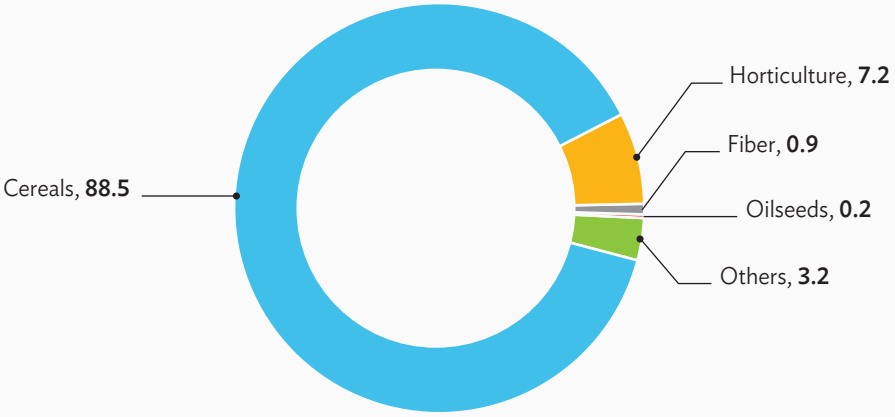
Figure A.1: Agricultural Land Types, Afghanistan, 2016
(%)



Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Figure A.2: Share of Cultivated Land by Crop Type, Afghanistan, 2014

(%)



Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Water Resources

Afghanistan has an annual internal water supply of around 47 billion cubic meters (m^3), of which around 38 billion m^3 is classified as internally produced surface water and 11 billion m^3 comes from internally produced groundwater, with an overlap of 1 billion m^3. The country's inland water resources originate from three major river basins: (i) Amu Darya Basin, (ii) Kabul/Indus Basin, and (iii) Helmand Water Basin. Of Afghanistan's 7.9 million ha of arable land, 3.2 million (roughly 41%) is irrigated. Agriculture is the largest user of water resources, accounting for more than 95% of available water.

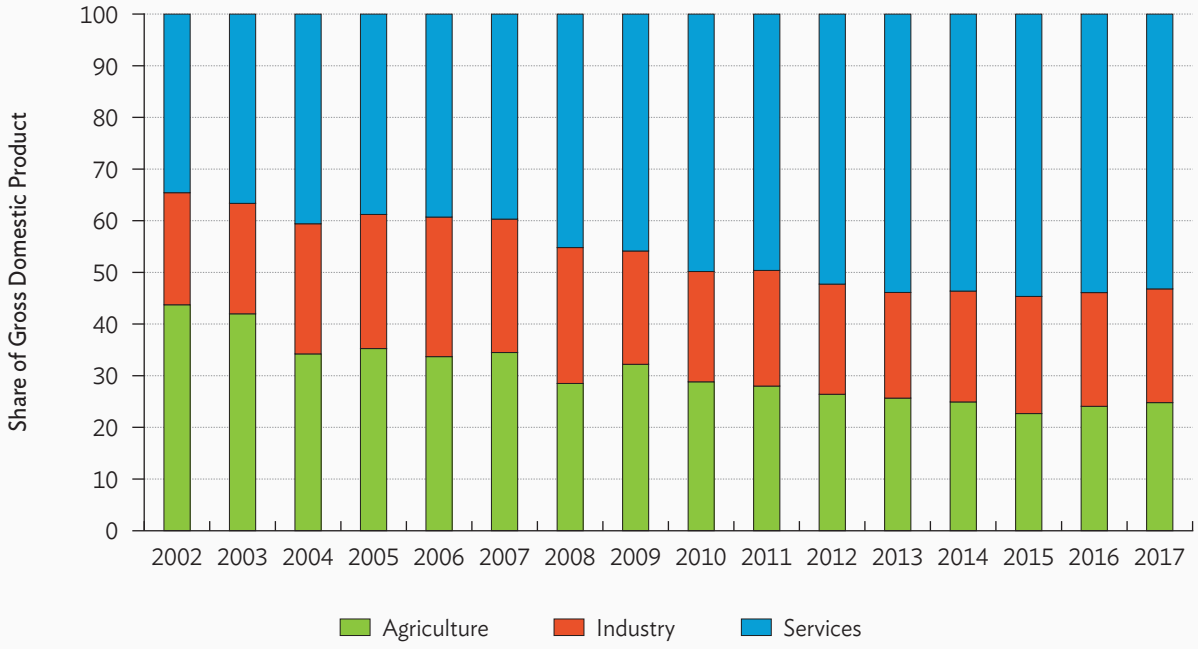
Agriculture and the Economy

Macroeconomic Trends

A significant portion of Afghanistan's economy is derived from its agriculture sector. However, agriculture's share in national output has exhibited a declining trend in recent years. In 2017, agriculture accounted for 24.8% of total gross domestic product (GDP), compared with 28.8% in 2010, and 43.7% in 2002 (Figure A.3). As of 2019, the services sector is the largest contributor in terms of value added to national GDP. In 2016, total value-added agricultural output was approximately $4.7 billion, compared to the national GDP of $20.2 billion. Afghanistan's per capita GDP in 2016 was $584.

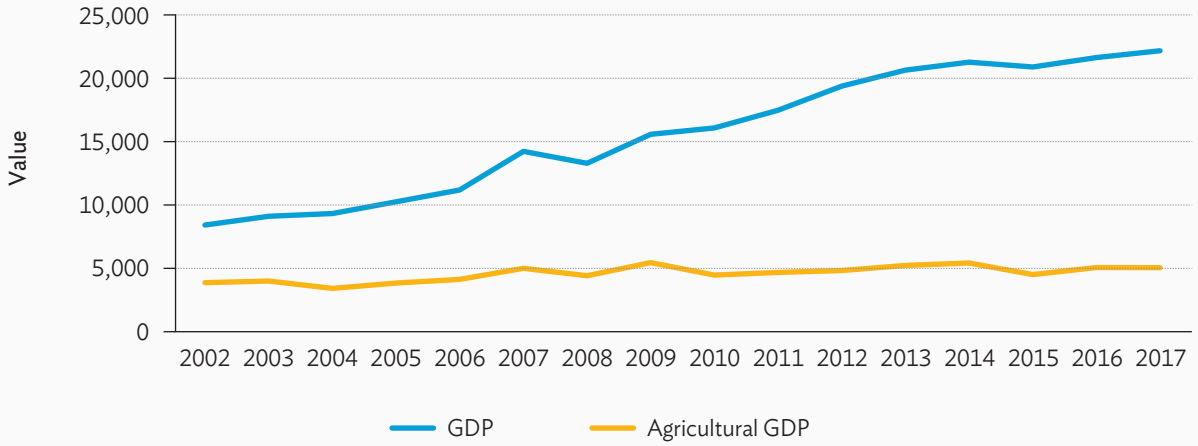
Figure A.4 illustrates the growth of total GDP and agricultural GDP, demonstrating the slower growth of the latter when compared with other sectors of the economy.

Figure A.3: Share of Gross Domestic Product by Sector, Afghanistan, 2002–2017
(%)



Source: Asian Development Bank.

Figure A.4: Growth of Agricultural and Total Gross Domestic Product, Afghanistan, 2002–2017
($ million, 2010 prices)

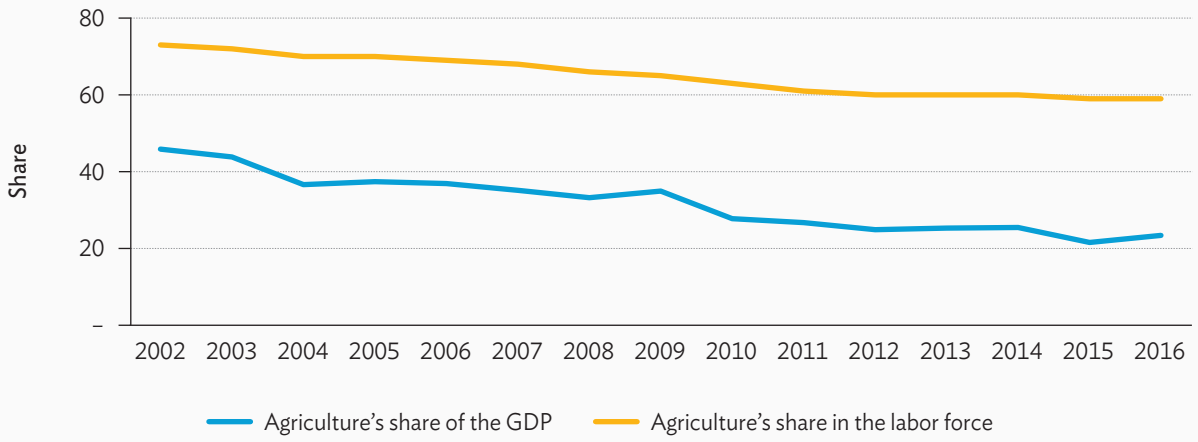


GDP = gross domestic product.

Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Figure A.5: Agriculture's Share of National Gross Domestic Product and Employed Labor Force, Afghanistan, 2002–2016

(%)



GDP = gross domestic product.

Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Figure A.5 provides a comparison of agriculture's share of the national GDP and its share of the employment of the labor force. Data suggest a large relative decrease in agricultural labor compared with other sectors since the early 2000s, from 73.1% in 2002 to 59.1% in 2016. It also shows that agriculture's share in both GDP and labor force has been decreasing in recent decades.

Agricultural Production

Wheat is Afghanistan's staple food item and produced on most of the country's cultivated land (70% of the cropped area). Apart from wheat, the livestock sector has more recently gained in importance and overtaken the cropping sector in terms of its contribution to the value of agricultural output—56% of value addition. The horticulture sector is small by comparison to wheat and livestock but is also growing in importance. Some of the most commonly grown horticultural products are grapes, apples, vegetables, watermelons, and other melons. Fertilizer usage in Afghanistan was measured at approximately 94,000 tons in 2016, 78,000 tons of which were imported.

Agricultural Trade

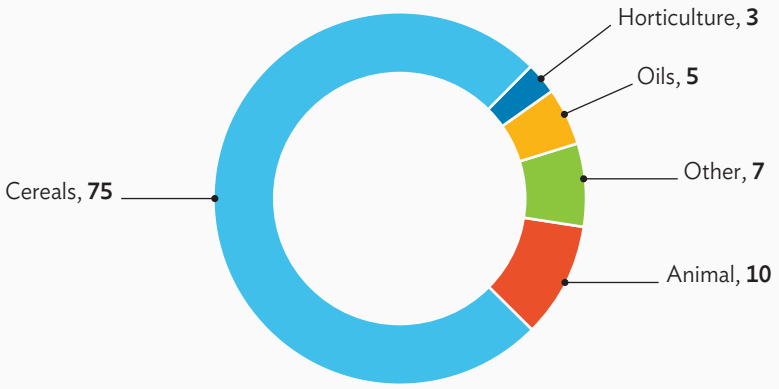
Afghanistan imported $2.2 billion worth of agricultural goods in 2016, compared with $436 million in agricultural exports. Afghanistan's top agricultural export commodities in 2016 were raisins ($56 million); grapes ($40 million); dried figs ($34 million); anise, fennel, coriander seeds ($27 million); apples ($26 million); and tomatoes ($22 million). Wheat flour was Afghanistan's key agricultural import valued at $561 million, followed by palm oil ($194 million), rice ($173 million), sugar ($123 million), tea ($90 million), and sunflower oil ($87 million).

Food Security

Food Intake

The daily calorific intake was 2,087 kilocalories (kcal) in 2013, with 1,369 kcal being derived from wheat products (Figure A.6). Calorific intake from animal sources comprised 10%, while fruit and vegetables accounted for 3%. Daily protein consumption per capita was estimated at 58.2 grams. Average dietary energy supply was estimated to be 95% adequate in 2015–2017, representing a decrease from the 2007–2012 figure.

Figure A.6: Share of Daily Kilocalorie per Capita by Food Group, Afghanistan, 2013
(%)



Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

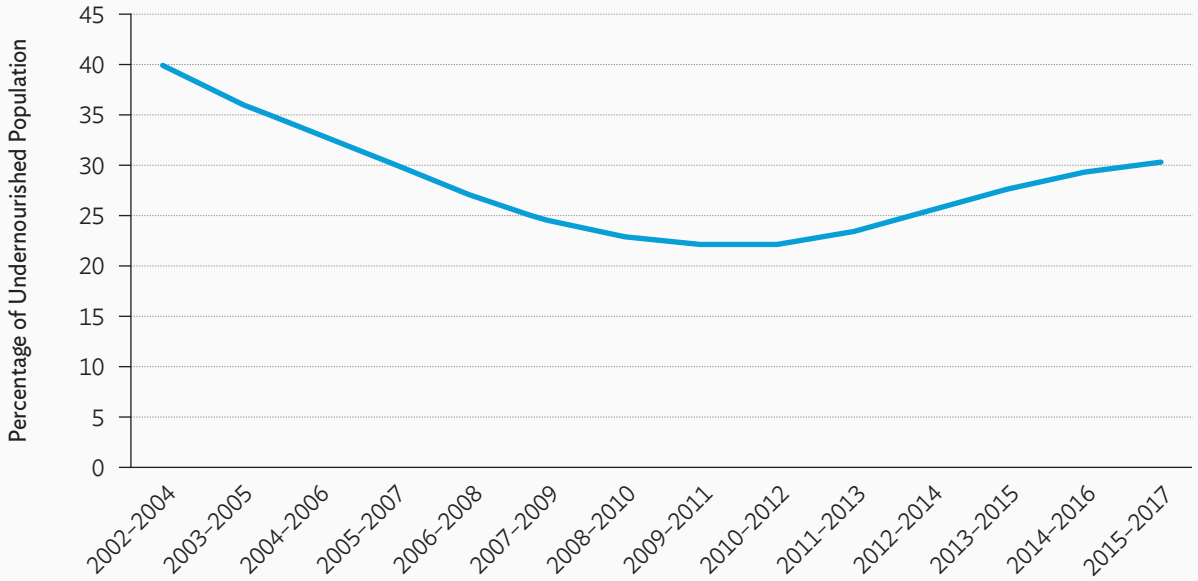
Malnutrition

The prevalence of undernourishment expresses the probability that a randomly selected individual from the country consumes an inadequate number of calories to cover his/her energy requirement, based on Food and Agriculture Organization of the United Nations (FAO) standard requirements (Figure A.7). During 2015–2017, this figure was 30.3%, representing an increase from 2009–2011 when undernourishment levels reached as low as 22.1%. However, the situation had improved from the early and mid-2000s, when these figures reached over 40% of the population.

Obesity is an increasing problem in developing countries, including Central Asia Regional Economic Cooperation (CAREC). However, anthropometric data show that this is a minor problem in Afghanistan. Obesity has been steadily increasing, from 2.1% in 2002 to 4.5% in 2016. While the prevalence of obesity is low compared with other CAREC countries, it demonstrates the same gradual upward long-term trend, as seen in other Central Asian countries (Figure A.8).

Figure A.7: Undernourished Population, Three-Year Average, Afghanistan, 2002–2017

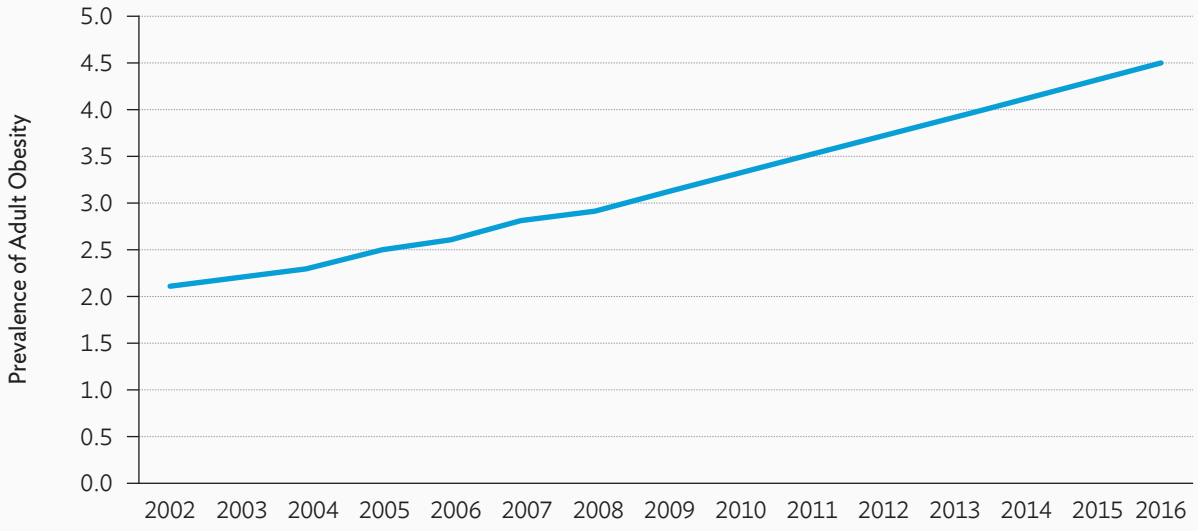
(%)



Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Figure A.8: Prevalence of Adult Obesity, Afghanistan, 2002–2016

(%)



Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Conclusions

Constraints

The principal constraints to achieving maximum productivity in agricultural production include (i) lack of investment in agricultural machinery, (ii) lack of availability of sustainable water resources, (iii) limited coverage of the agricultural export market and heavy reliance on imported agricultural products, (iv) inadequacy and inefficiency of agricultural infrastructure, and (v) poor research and development investment. Addressing these issues could result in remarkable improvements in agricultural productivity. Afghanistan also continues to deal with ongoing political instability that affects more than 70% of the country, including agricultural zones.

Potential for Agricultural Development

The lack of water resources is a major contributor to low farm productivity. The further modernization of irrigated agriculture is an important point of development that will stimulate economic growth. Also, land tenure rights must be properly implemented. Afghanistan needs to lay the groundwork for identifying and implementing targeted policy strategies that involve active stakeholder participation to ensure that the enabling conditions for efficient agricultural production are put in place.

AZERBAIJAN

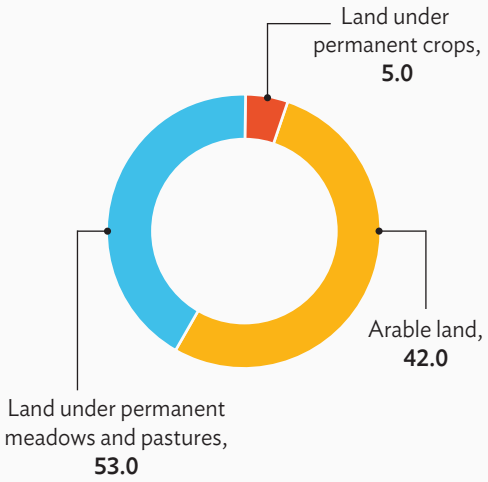
With a population of 10 million (of which 4.5 million live in rural areas), Azerbaijan is at the crossroads of Southwest Asia and Southeastern Europe. It is bounded to the north by the Russian Federation, to the east by the Caspian Sea, to the south by Iran, to the west by Armenia, and to the northwest by Georgia. A former Soviet state, Azerbaijan has grown rapidly since 2000s due to an influx of investment in energy and industry. However, as Azerbaijan's industrial sector has developed rapidly, agriculture has failed to keep pace and remained vulnerable to various environmental, political, and economic shocks. Policy interventions promoting sustainable development in the agriculture sector could address these lingering concerns.

Resource Endowment and Input Usage

Land Resources

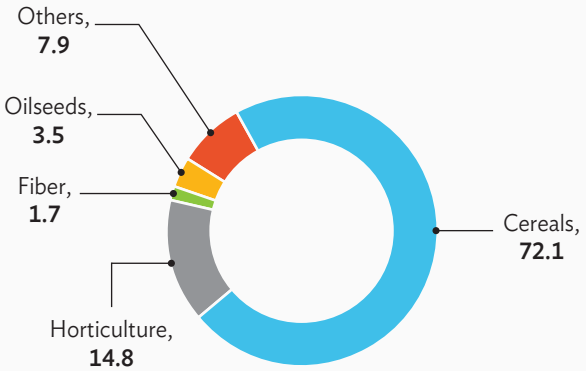
As of 2016, roughly 56% (4.8 million ha) of Azerbaijan's land is utilized for agriculture. Out of the total agricultural area, around 42% (2.0 million ha) is arable, 53% (2.5 million ha) is classified as permanent meadow and pasture, and 5% (241,000 ha) is categorized for permanent or plantation crops (Figure A.9). Crops produced in Azerbaijan include (i) cereals (72.1% of the cropped area), (ii) horticulture (14.8%), (iii) oilseeds (3.5%), (iv) fiber crops (1.7%), and (v) other crops (7.9%) (Figure A.10).

Figure A.9: Agricultural Land Types, Azerbaijan, 2016
(%)



Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Figure A.10: Share of Cultivated Land by Crop Type, Azerbaijan, 2014
(%)



Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Water Resources

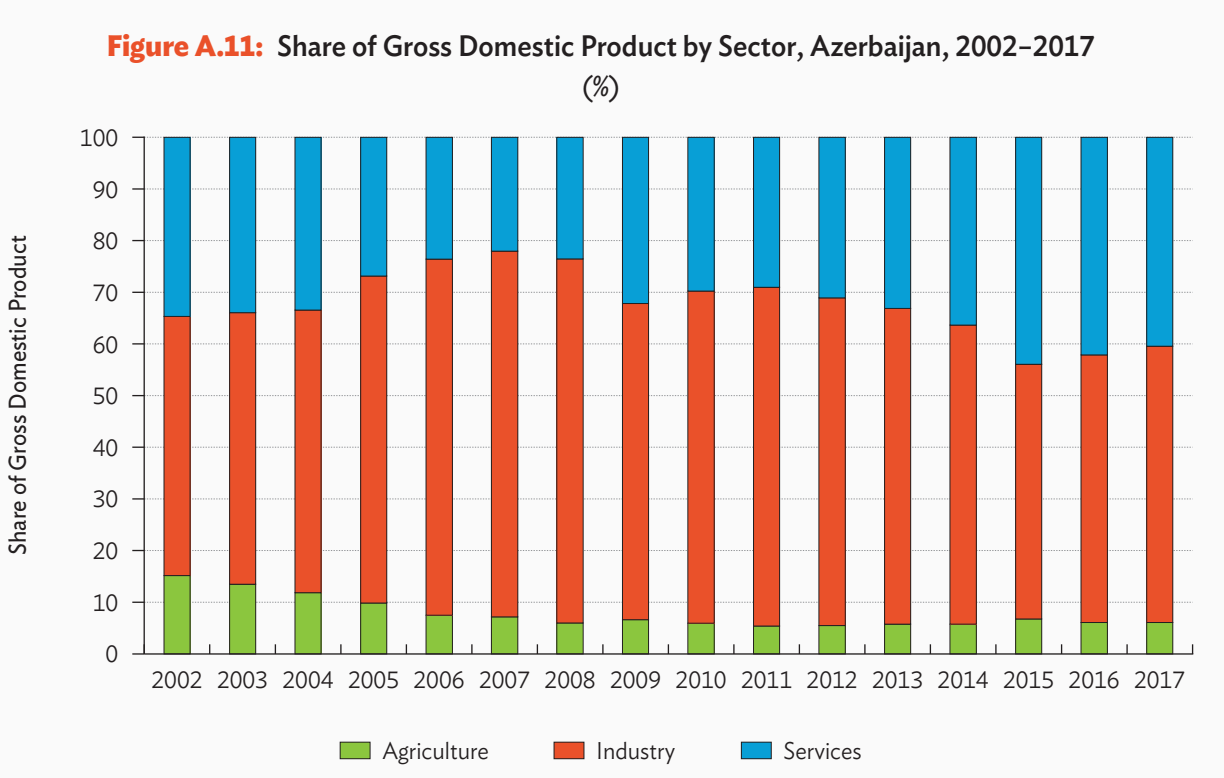
Azerbaijan has an annual water supply of around 8.1 billion cubic meters, of which around 6.0 billion m^3 is classified as internally produced surface water and 6.5 billion m^3 comes from groundwater, with an overlap of 4.4 billion m^3. The country's inland water resources originate from four major river basins, two of which are shared with adjoining countries. The largest of the basins are the Kura and Arak rivers that are shared with Turkey. The Samur River Basin in the northeast is along the border with the Russian Federation. Of Azerbaijan's 3.2 million ha of potentially irrigable land, only 1.4 million ha (roughly 45%) is currently equipped for irrigation. Agriculture accounted for 73% of total water withdrawal in 2017.

Agriculture and the Economy

Macroeconomic Trends

A relatively small portion of Azerbaijan's economy is derived from its agriculture sector. Agriculture's already small share in national output has exhibited a decreasing trend in recent years. In 2017, agriculture accounted for 6.1% of total GDP, compared with 7.2% in 2007 and 15.2% in 2002 (Figure A.11). As of 2019, the industrial sector is the largest contributor to national GDP. In 2016, total value-added agricultural output was approximately $2.1 billion, compared to the national GDP of $37.8 billion. Azerbaijan's per capita GDP in 2016 was $3,892.

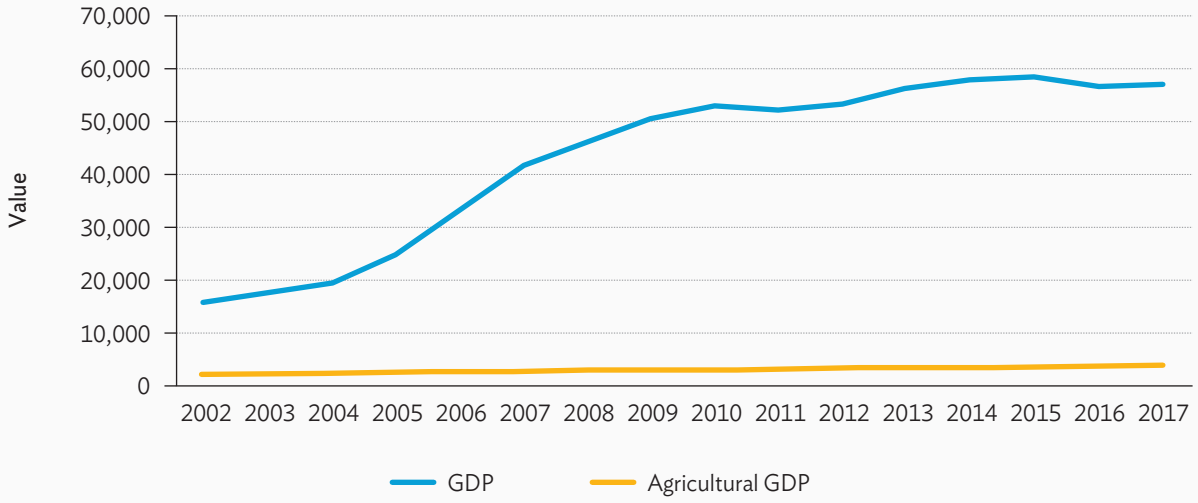
Figure A.11: Share of Gross Domestic Product by Sector, Azerbaijan, 2002–2017



Source: Asian Development Bank.

Figure A.12 illustrates the growth of GDP compared with the agricultural GDP, demonstrating the sluggish growth of the latter compared with other sectors. Azerbaijan is an energy-exporting country and is vulnerable to commodity price fluctuations that are energy linked.

Figure A.12: Growth of Agricultural and Total Gross Domestic Product, Azerbaijan, 2002–2017
($ million, 2010 prices)



GDP = gross domestic product.

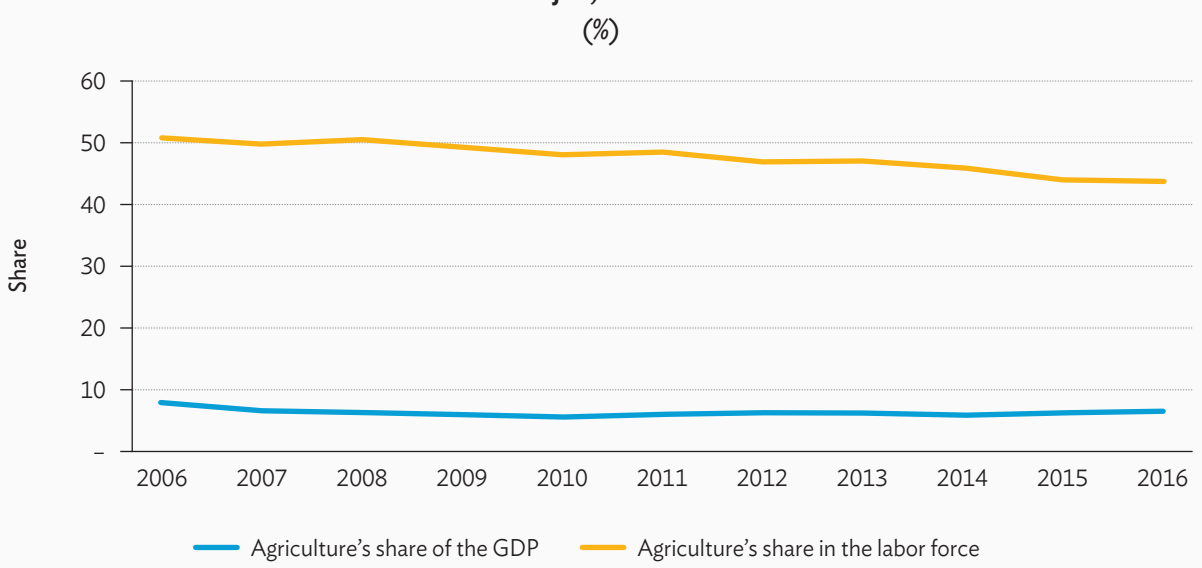
Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Figure A.13 compares agriculture's share of the national GDP and its share of the employed labor force. Data suggest a small but steady decrease in agricultural labor compared with other sectors from 50.8% in 2006 to 43.7% in 2016. It also shows that agriculture's share of GDP has fallen more rapidly than its share in labor.

Agricultural Production

Approximately 57% of total agricultural production comes from the cropping sector, compared with 43% for livestock. Dairy products were the single most valuable commodity produced in Azerbaijan, totaling around $598 million in 2016. Other important commodities included beef ($554 million), sheep meat ($353 million), wheat ($311 million), potatoes ($223 million), and tomatoes ($176 million). Wheat was produced in the greatest quantity at 1.8 million tons. Other important products included barley (929,000 tons), potatoes (902,000 tons), tomatoes (503,000 tons), and watermelons (348,000 tons). Around 28,000 tons of fertilizers were used in Azerbaijan in 2016, and a further 46,000 tons were imported that year.

Figure A.13: Agriculture's Share of National Gross Domestic Product and Employed Labor Force, Azerbaijan, 2006–2016



Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Agricultural Trade

In 2016, Azerbaijan imported $1.2 billion worth of agricultural goods and exported $417 million. Azerbaijan's main agricultural exports commodities by value were hazelnuts ($84 million), tomatoes ($82 million), persimmons ($59 million), apples ($21 million), cherries ($21 million), and sugar ($16 million). Wheat flour was the main agricultural import valued at $225 million, followed by rice ($79 million), tea ($54 million), processed foods ($53 million), sunflower oil ($50 million), and butter ($49 million).

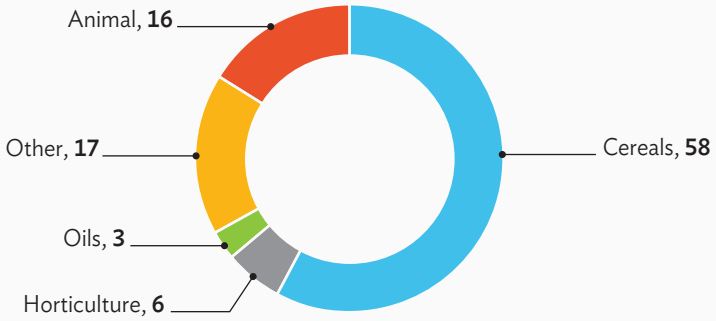
Food Security

Food Intake

Daily per capita calorific intake was estimated at 3,118 kcal in 2013. Figure A.14 reports the proportion of calorific intake contributed by each major food category. Cereals accounted for 58% of daily intake in 2013. Calories from animal sources comprised 16%, while fruit and vegetables accounted for 6%. Daily per capita consumption of protein was estimated at 93.2 grams. Average dietary energy supply adequacy was estimated to be 130% in 2015–2017, representing a sharp increase since the early 2000s.

Figure A.14: Share of Daily Kilocalorie per Capita by Food Group, Azerbaijan, 2013

(%)



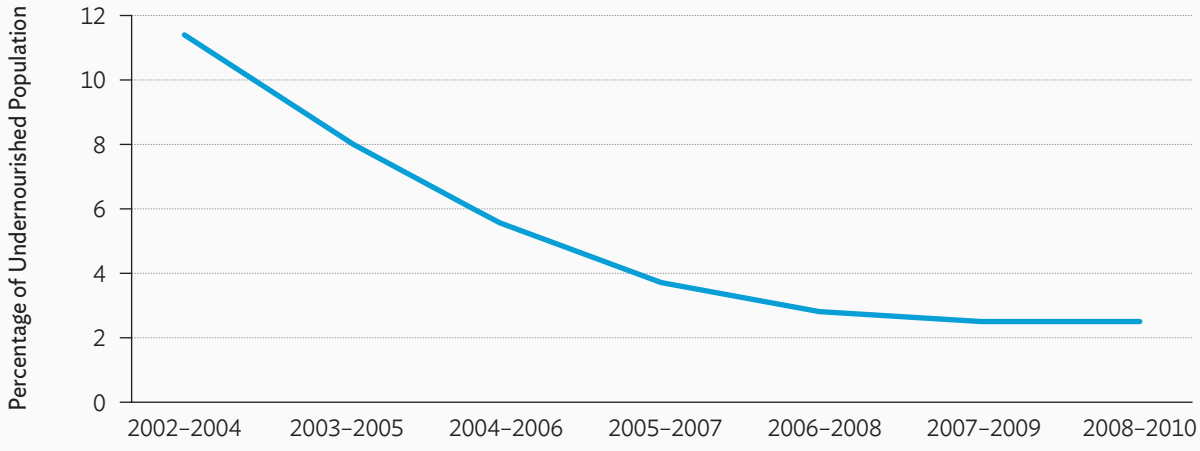
Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Malnutrition

Figure A.15 shows the medium-term trend of undernourishment in Azerbaijan. The prevalence of undernourishment expresses the probability that a randomly selected individual from the country consumes an inadequate number of calories to cover his/her energy requirement, based on FAO standards. During 2015–2017, this figure was less than 2.5%, representing a steady decline since the late 2000s. This is a drastic decrease from levels seen during the first decade of independence when more than 10% of the population was considered undernourished.

Figure A.15: Undernourished Population, Three-Year Average, Azerbaijan, 2002–2010

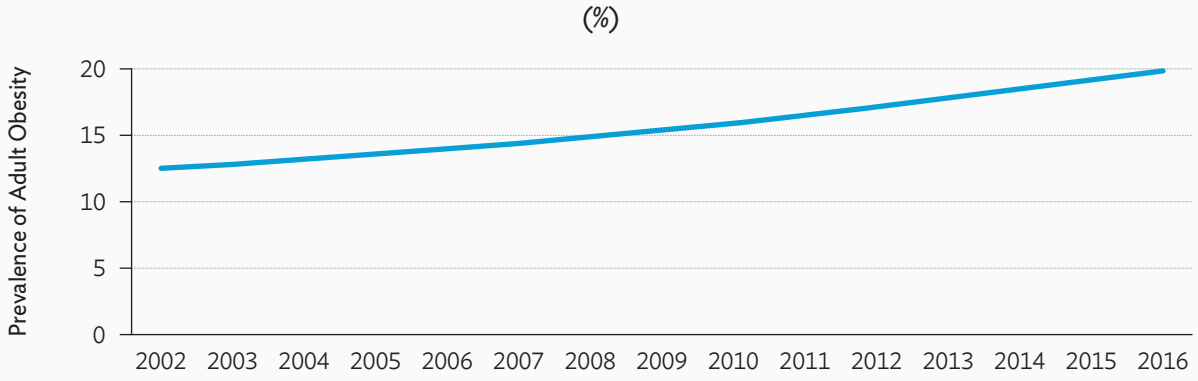
(%)



Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Obesity is an increasing problem in developing countries, including CAREC. Anthropometric data show that this has become a significant problem in Azerbaijan. Obesity has been steadily increasing, from 12.5% in 2002 to 19.9% in 2016 (Figure A.16). The prevalence of obesity is high compared with other CAREC countries and demonstrates the same upward long-term trend.

Figure A.16: Prevalence of Adult Obesity, Azerbaijan, 2002–2016



Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Conclusions

Constraints

Azerbaijan remains vulnerable to some problems that inhibit the country from maximizing the potential of its agriculture sector. It is hindered by poor and underdeveloped irrigation infrastructure. Progress in terms of modernizing existing infrastructure has been slow. Farm technology—in the form of machinery and new seed varieties—is lacking in the agriculture sector, and funding for agricultural research and development is negligible. Farmers often lack the necessary training and education in improved farming techniques. Extension services need to be expanded. Moreover, the country is highly vulnerable to climate change effects, especially with the growing problem of flooding and droughts in the region. Sluggish agricultural productivity has resulted in stagnant growth, especially compared with other sectors of the economy.

Potential for Agricultural Development

Agriculture had taken a backseat to industrial development in national development programs throughout much of Azerbaijan's recent history. The sharp growth in the country's energy industry diverted attention away from agriculture, as the government focused on more productive sectors of the economy. However, with the understanding that oil resources are becoming depleted, Azerbaijan must adapt its economy to a more sustainable future, depending on renewable resources rather than extractive ones. The country has a large dependency on cereals but is better suited to horticultural production. By introducing modern farming techniques and mechanization, Azerbaijan can improve productivity and establish a food-secure nation.

PEOPLE'S REPUBLIC OF CHINA

With a total population of 1.4 billion (of which 563 million or 40% live in rural areas), the People's Republic of China (PRC) has about 21% of the world's population. It also has about 6% of the world's freshwater resources and 9% of the world's farmland. Given its extensive land area, the PRC has various landscapes and climatic zones. The western PRC features mostly mountainous terrain and arid regions, highlighted by the Himalayan Mountain Range and the Taklamakan Desert. The vast Gobi Desert is in north-central PRC and straddles the border with Mongolia. The PRC's central region is hilly and marks the western boundaries of a massive productive agricultural region spreading over main river deltas in the southeast and east. Chinese agriculture has developed in parallel with a major economic boom that began in the late 20th century, which raised living standards for a significant portion of the population. The PRC is among the world's leading producers of many major commodities, but Chinese agriculture is confronted with limited resources in the face of growing demand by an increasingly affluent consumer base.

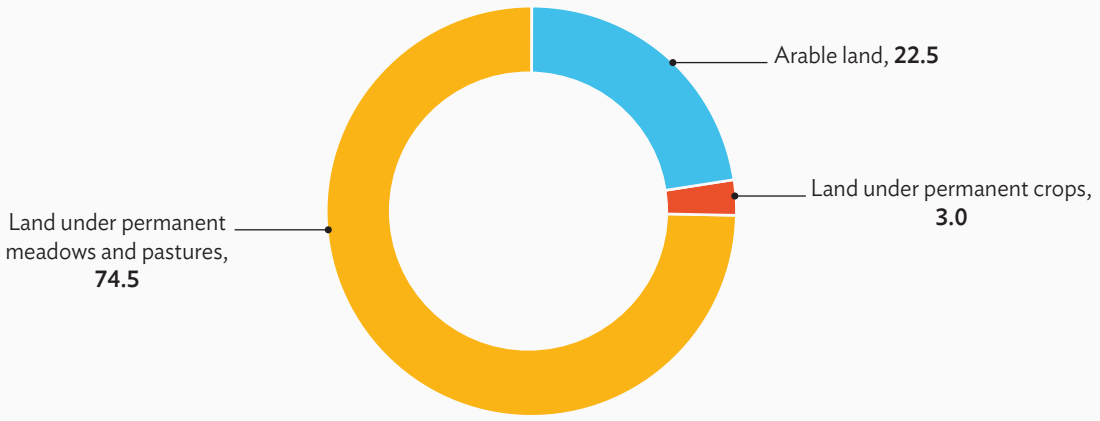
Resource Endowment and Input Usage

Land Resources

As of 2016, roughly 55.2% (527.7 million ha) of PRC's land was utilized for agriculture. Of the total agricultural area, around 22.5% (118.9 million ha) is considered arable, 74.5% (392.8 million ha) is classified as permanent meadow and pasture, and only 3.0% (16,000 ha) is categorized as permanent cropping land (Figure A.17). Crops produced in the PRC include cereals (54.0% of the cropped area), horticulture (21.8%), oilseeds (14.6%), fiber crops (2.5%), and other crops (7.1%) (Figure A.18).

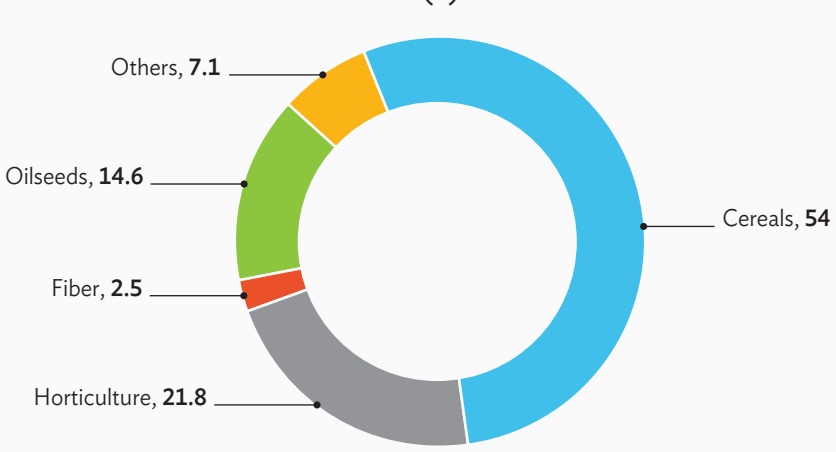
Figure A.17: Agricultural Land Types, People's Republic of China, 2016

(%)



Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Figure A.18: Share of Cultivated Land by Crop Type, People's Republic of China, 2014



Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Water Resources

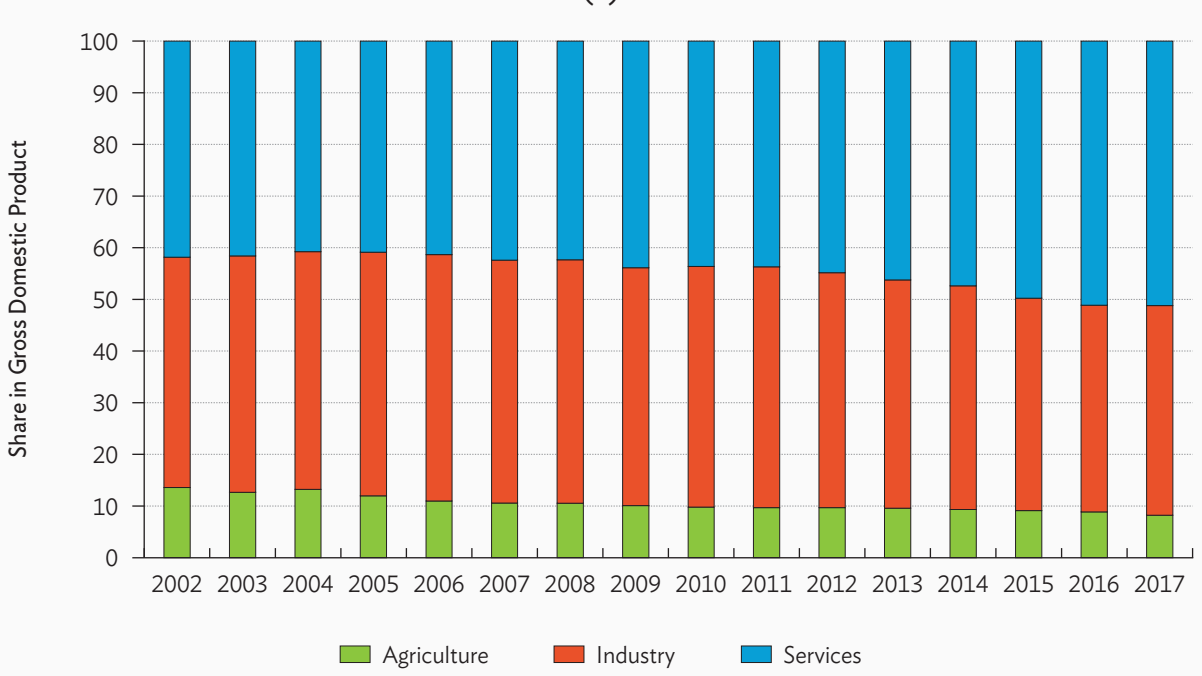
Given its large population, the PRC is one of the most water-stressed countries in the world. It has an annual water supply of around 2.8 trillion m^3, of which around 2.7 trillion m^3 is classified as internally produced surface water and 829 billion m^3 comes from internally produced groundwater, with an overlap of 728 billion m^3. Its territory can be divided into nine river basins. In the north, there are the Song-Liao or Heilong (Amur)-Songhua, the Huai, the Huang (Yellow), the Hai-Luan, and the interior or endorheic river basin groups. The total average annual internal renewable surface water resources in these five river basin groups comprise around 20% of the country's total. In the south, there are the Chang (Yangtze), the Zhu (Pearl), the southwest, and the southeast river basin groups. The total average annual internal renewable surface water resources in these four river basin groups account for around 80% of the country's total. There are greater water resources in the south than the north. The country reports good performance for irrigation, with 69.9 million ha (roughly 99.8%) of the 70 million ha of potentially irrigable land currently developed for irrigation. In 2017, agriculture accounted for 62% of total water use, followed by industry (21%), municipal consumption (14%), and ecological protection (3%).

Agriculture and the Economy

Macroeconomic Trends

A relatively small portion of the PRC's economy is generated by its agriculture sector. Agriculture's already small share in national output has decreased in recent years. In 2017, agriculture accounted for 7.9% of GDP, compared with 10.3% in 2007 and 13.3% in 2002 (Figure A.19). As of 2019, the service sector is the largest contributor to national GDP. In 2017, total value-added agricultural output was approximately $968 billion, compared with the national GDP of $12.2 trillion. Its GDP per capita in 2017 was $7,993.

Figure A.19: Share of Gross Domestic Product by Sector, People's Republic of China, 2004–2017



Source: Asian Development Bank.

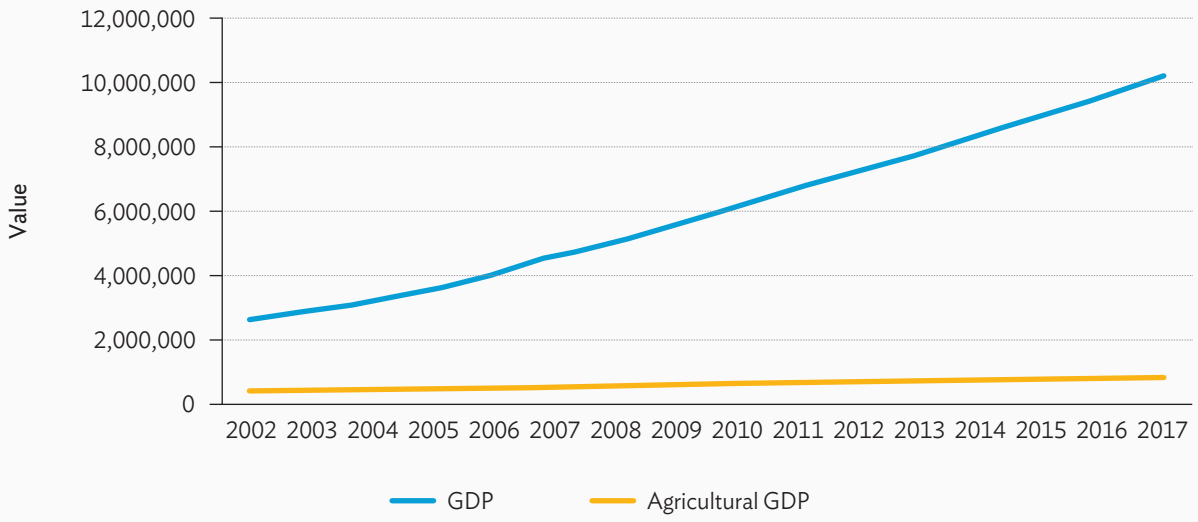
Figure A.20 illustrates the growth of total GDP and agricultural GDP, demonstrating the sluggish growth of the latter when compared with other sectors of the economy.

Data on agriculture's share of the national GDP and its share of the employed labor force are presented in Figure A.21. It suggests a relatively rapid decrease in agricultural labor compared with other sectors since the early 2000s, from 13.6% in 2002 to 8.9% in 2016.

Agricultural Production

Approximately 69.8% of total agricultural production was derived from the crop sector, compared with 30.2% from the livestock subsector. Pork was the single most valuable commodity produced in the PRC in 2016, totaling around $331 billion. Other important commodities included rice ($117 billion), maize ($61 billion), fresh vegetables ($54 billion), and wheat ($51 billion). Vegetables were the most commonly produced item, with a total quantity of 508 million tons. Other important products were maize and maize products (219 million tons), milled rice (136 million tons), sugarcane (128 million tons), and wheat and wheat products (122 million tons). Around 59 million tons of fertilizers were used in the PRC in 2017, and a further 600,000 tons were imported into the country that year.

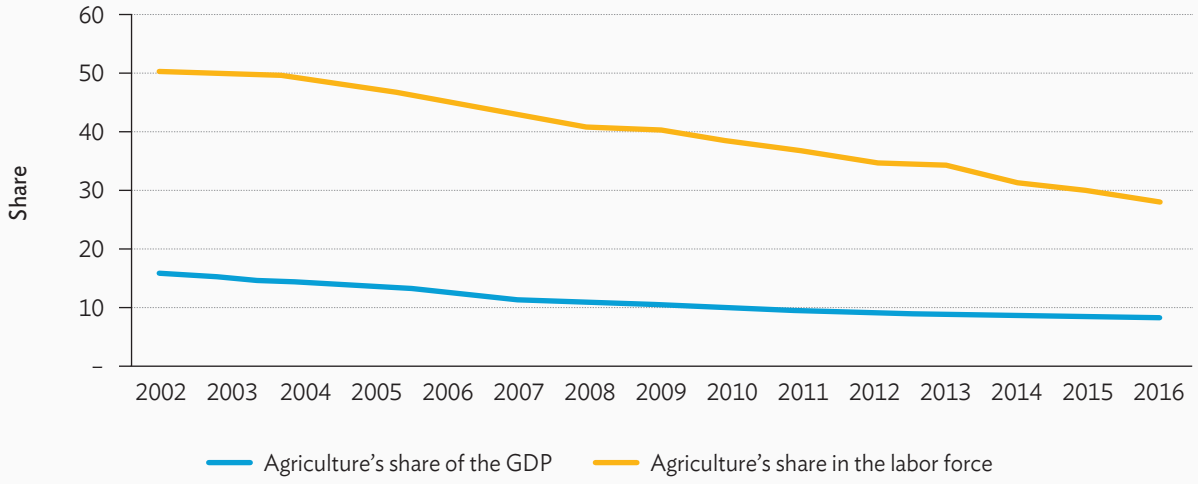
Figure A.20: Growth of Agricultural and Total Gross Domestic Product, People's Republic of China, 2002–2017
($ million, 2010 prices)



GDP = gross domestic product.

Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Figure A.21: Agriculture's Share of National Gross Domestic Product and Employed Labor Force, People's Republic of China, 2002–2016
(%)



Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Agricultural Trade

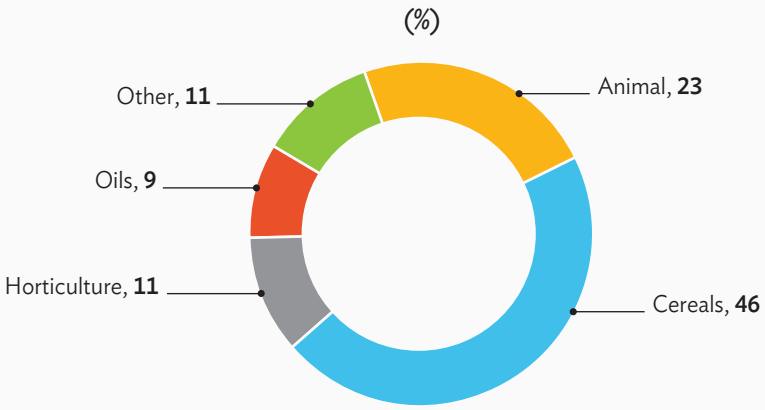
The PRC imported $100 billion worth of agricultural goods in 2016, compared with $47 billion worth of agricultural exports. The PRC's leading agricultural exports were crude agricultural materials ($5.2 billion), processed foods ($4.6 billion), garlic ($2.6 billion), preserved vegetables ($2.0 billion), and processed fruit ($1.9 billion). Soybeans were the country's main agricultural import valued at $34 billion, followed by beef ($4.5 billion), processed food ($4.5 billion), wine ($4.2 billion), and baby food ($3.1 billion).

Food Security

Food Intake

The average daily per capita calorific intake was estimated at 3,108 kcal in 2013. Figure A.22 shows the proportion of daily calorific intake by each food group. Cereals accounted for 46% of daily calorific intake in the PRC in 2013. Calorific intake from animal sources comprised 23%, while fruit and vegetables accounted for 11%. Daily per capita protein consumption was estimated at 98 grams, while the average dietary energy supply adequacy was estimated to be 131% over 2015–2017, representing a sharp increase since the early 2000s.

Figure A.22: Share of Daily Kilocalorie per Capita by Food Group, People's Republic of China, 2013



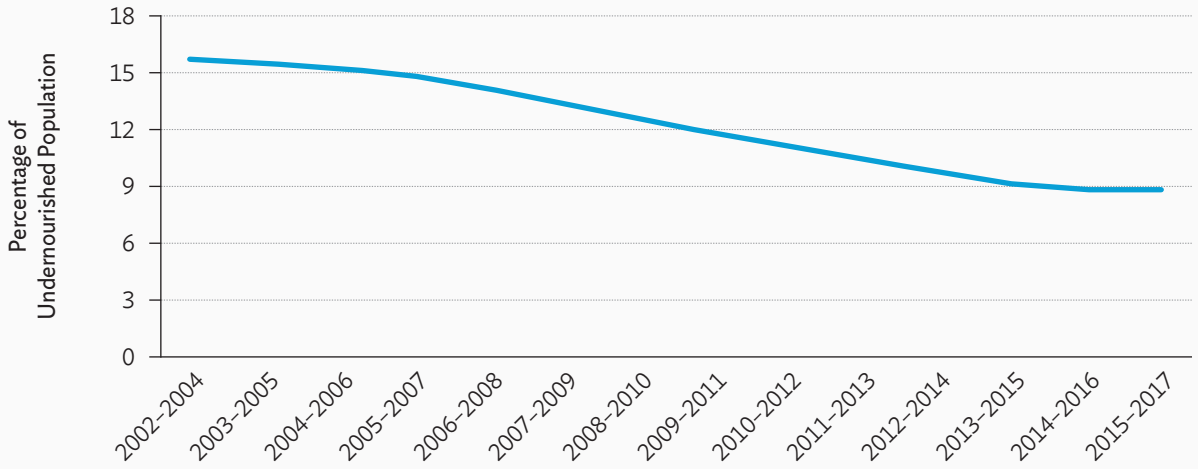
Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Malnutrition

Figure A.23 shows the medium-term trend of undernourishment in the PRC. The prevalence of undernourishment reports the probability that a randomly selected individual from the PRC consumes an inadequate number of calories to cover his/her energy requirement (based on FAO criteria). During 2015–2017, this figure was less than 8.7%, a steady decrease since the late 2000s.

Figure A.23: Undernourished Population, Three-Year Average, People's Republic of China, 2002–2017

(%)

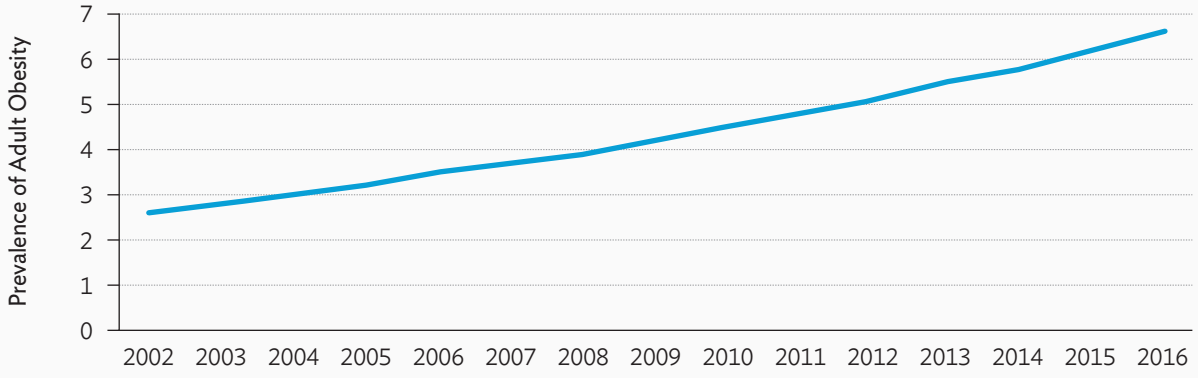


Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Obesity is an increasing problem in developing countries, including CAREC. Anthropometric data show that this is a growing problem in the PRC. Obesity had been rapidly increasing, from 2.6% in 2002 to 6.6% in 2016 (Figure A.24). The prevalence of obesity is low compared with other CAREC countries but demonstrates the same upward long-term trend.

Figure A.24: Prevalence of Adult Obesity, People's Republic of China, 2002–2016

(%)



Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Conclusions

Constraints

Chinese agriculture is constrained by its land and water resources, which also face pressure from environmental problems. The country's past agricultural development did not prioritize sustainable use of its natural resources. The long-term trend of urbanization has reduced the agricultural labor force with a concomitant rise in labor costs. Therefore, finding new sources of agricultural productivity is key to future growth in the sector. The PRC's reliance on exports for certain product categories, especially oilseeds, leaves it vulnerable to external shocks and changes in policy. Food safety and the development of agricultural value chains require attention and may have positive ramifications throughout the sector.

Potential for Agricultural Development

Increasing agricultural productivity and sustainability will allow the PRC to overcome its constraints. Balancing a drive for agricultural development with a need to practice better stewardship of its natural resources and environment, the PRC will have to implement policies that will be able to address the growing demand for agricultural products. Research and the introduction of new technologies may be partial solutions, and policy makers must seek ways to leverage the country's indigenous technical expertise for use in agriculture. Moreover, the PRC must disseminate this knowledge to its farmers. The agriculture sector may have access to opportunities arising from the growing wealth of domestic consumers and closer links to Central Asia, the Middle East, and Europe via the Belt and Road Initiative (BRI). Increasing the competitiveness of Chinese agriculture, therefore, should be a priority.

GEORGIA

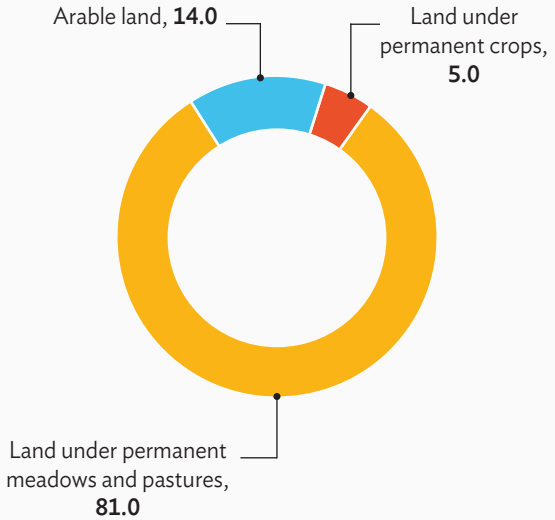
With a total population of 3.9 million (of which 1.6 million or 41% live in rural areas), Georgia is at the crossroads of West Asia and Eastern Europe. It is bound to the north by the Russian Federation, to the west by the Black Sea, to the south by Turkey and Armenia, and to the southeast by Azerbaijan. Georgia has seen rapid economic growth despite global economic slowdowns and conflict with the Russian Federation in the late 2000s. Manufacturing, transport, and financial services have helped contribute to recent growth. However, despite positive overall growth, agriculture has remained sluggish. Without proper development, it will become vulnerable to various environmental, political, and economic shocks.

Resource Endowment and Input Usage

Land Resources

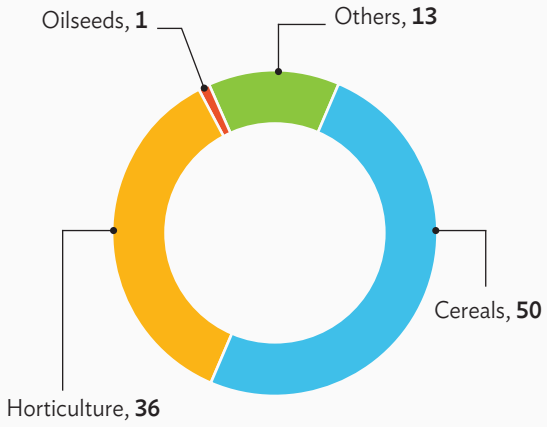
As of 2016, roughly 34% (2.4 million ha) of Georgia's land is utilized for agriculture. Of the total agricultural area, around 14% (344,000 ha) is arable, 81% (1.9 million ha) is classified as permanent meadow and pasture, and 5% (110,000 ha) is categorized as growing permanent or plantation crops (Figure A.25). Crops produced in Georgia include cereals (50.2% of the cropped area), horticulture (36.0%), oilseed crops (0.8%), and other crops (13.0%) (Figure A.26).

Figure A.25: Agricultural Land Types, Georgia, 2016
(%)



Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Figure A.26: Share of Cultivated Land by Crop Type, Georgia, 2014
(%)



Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Water Resources

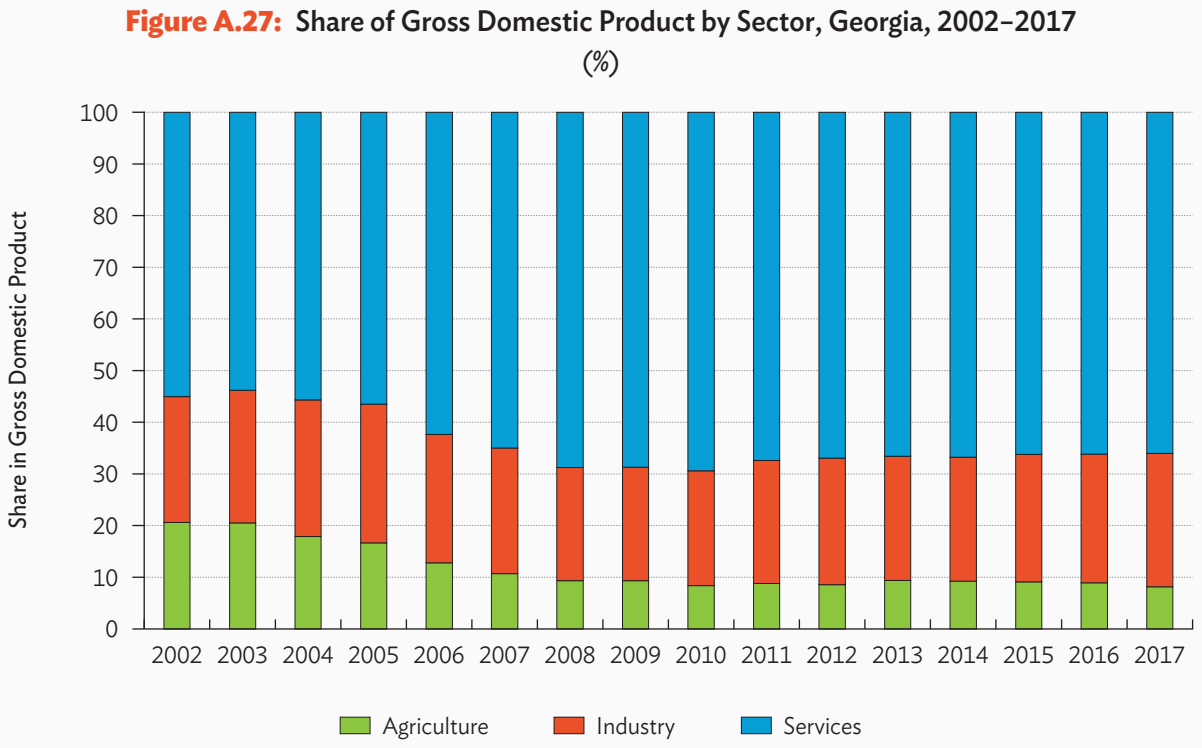
Georgia has an annual water supply of 58 billion m^3, of which around 57 billion m^3 is classified as internally produced surface water and 17 billion m^3 comes from internally produced groundwater, with an overlap of 16 billion m^3. The country's inland water resources originate from over 25,000 rivers measuring nearly 55,000 kilometers in length. These rivers are connected to the Black Sea and Caspian Sea basins. Of Georgia's 725,000 ha of potentially irrigable land, only 433,000 ha (roughly 60%) is currently developed for irrigation. According to the Ministry of Environment and Natural Resources Protection of Georgia, agriculture accounts for 50%–60% of total water use from 2010 to 2017.

Agriculture and the Economy

Macroeconomic Trends

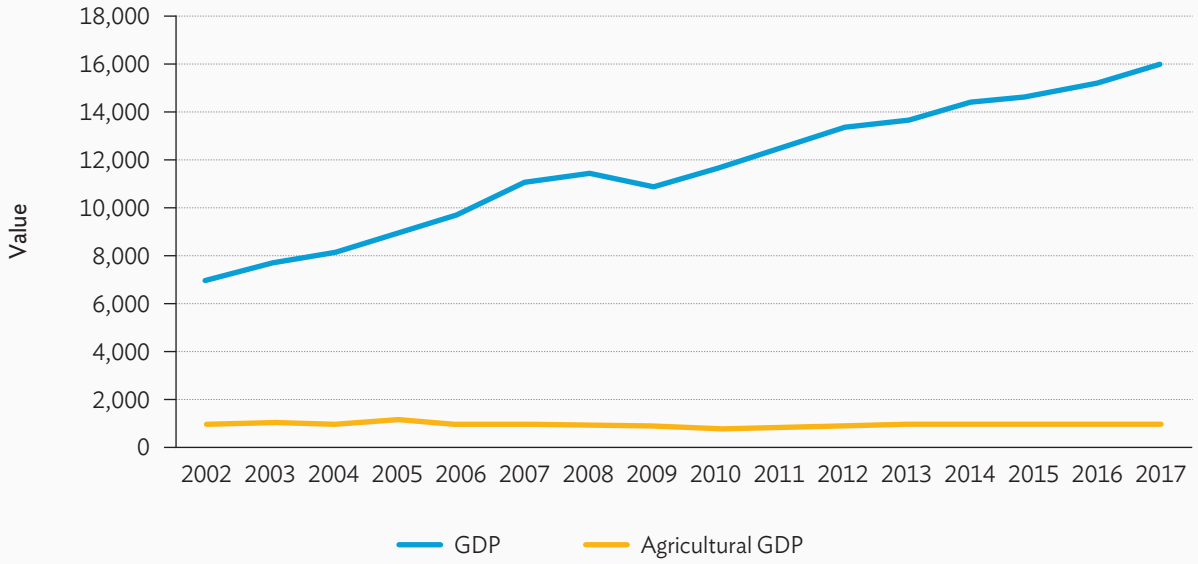
A relatively small portion of Georgia's economy is generated from its agriculture sector. Agriculture's already small share has remained steady after a decline in the mid-2000s. In 2017, agriculture accounted for 8.2% of total GDP, compared with 8.4% in 2010 and 20.6% in 2002 (Figure A.27). As of 2019, the services sector is the largest contributor to national GDP. In 2016, total agricultural output was approximately $1.1 billion, compared with national GDP of $14.3 billion. Georgia's per capita GDP in 2016 was $3,651.

Figure A.27: Share of Gross Domestic Product by Sector, Georgia, 2002–2017



Source: Asian Development Bank.

Figure A.28: Growth of Agricultural and Total Gross Domestic Product, Georgia, 2002–2017
($ million, 2010 prices)



GDP = gross domestic product.

Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

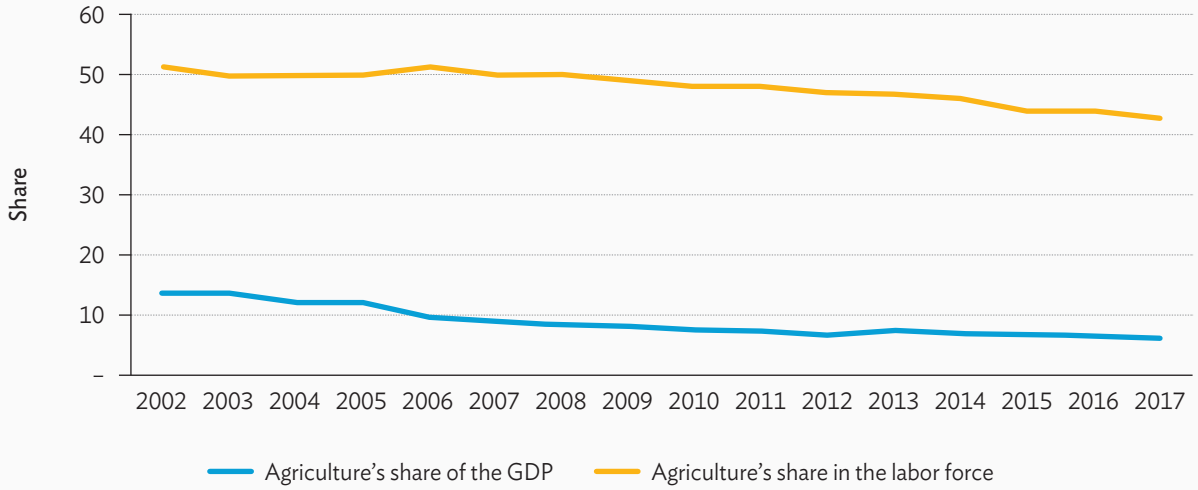
Figure A.28 illustrates the growth of total and agricultural GDP, demonstrating virtually no growth of the latter, especially when compared with other sectors of the economy.

Figure A.29 compares agriculture's share of national GDP with the sector's share of the employed labor force. Data suggest a small but steady decrease in agricultural labor compared with other sectors since the early 2000s, from 50.5% in 2002 to 43.1% in 2016. It also shows that agriculture's share of GDP has fallen more rapidly than its share of employment, even though it has remained steady since 2010.

Agricultural Production

Approximately 45% of agricultural production is generated by the cropping subsector, compared with 55% by livestock. Beef was the single most valuable commodity produced in Georgia in 2016 at around $208 million. Other important commodities included cow's milk ($179 million), grapes ($62 million), hazelnuts ($55 million), maize ($53 million), and eggs ($53 million). Potatoes were the largest crop, with a total production of 249,000 tons. Other important products included maize (244,000 tons), grapes (159,000 tons), wheat (127,000 tons), and apples (65,000 tons). Around 59,000 tons of fertilizers were used in Georgia in 2016, and a further 18,000 tons were imported into the country that year.

Figure A.29: Agriculture's Share of National Gross Domestic Product and Employed Labor Force, Georgia, 2002–2017
(%)



GDP = gross domestic product.

Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Agricultural Trade

Georgia imported $1 billion worth of agricultural goods in 2016, compared with $660 million agricultural exports. Georgia's top agricultural export commodities were hazelnuts ($173 million), wines ($113 million), distilled alcoholic beverages ($92 million), bottled water ($80 million), nonalcoholic beverages ($12 million), and soybeans ($11 million). Wheat was Georgia's main agricultural import valued at $101 million, followed by chicken meat ($57 million), processed foods ($55 million), chocolate products ($51 million), sugar ($41 million), and sunflower oil ($40 million).

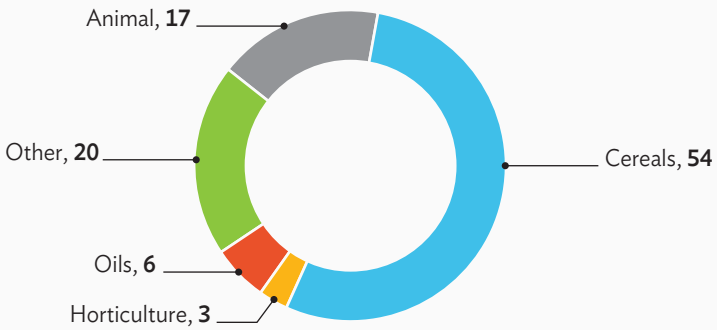
Food Security

Food Intake

The average daily per capita calorific intake was estimated at 2,905 kcal in 2013. Figure A.30 reports the proportion of calorific intake contributed by major food groups. Cereals accounted for 54% of daily calorific intake in 2013. Calorific intake from animal sources comprised 17%, while fruit and vegetables accounted for 3%. The average daily per capita protein consumption was estimated at 80.5 grams, while the average dietary energy supply adequacy was estimated to be 115% in 2015–2017.

Figure A.30: Share of Daily Kilocalorie per Capita by Food Group, Georgia, 2013

(%)



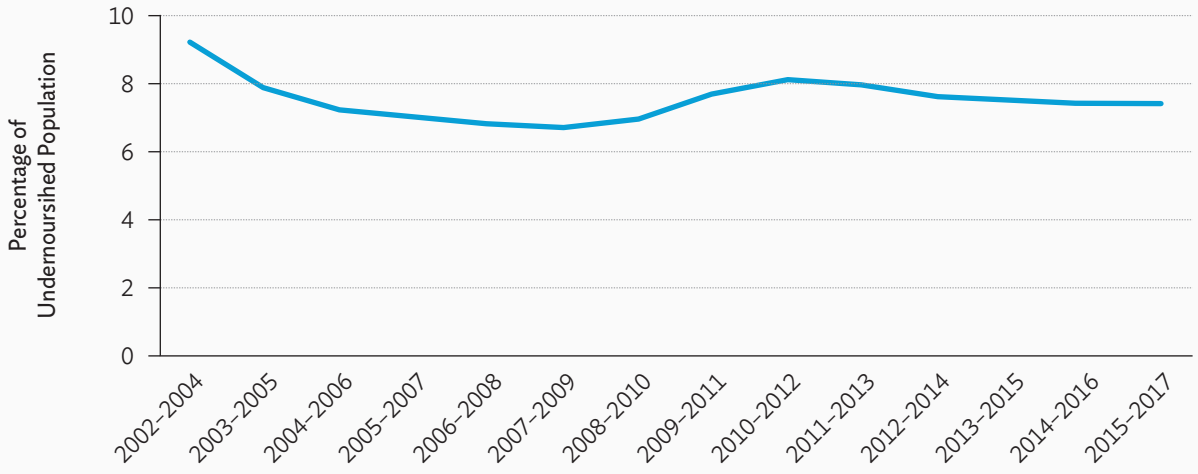
Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Malnutrition

The prevalence of undernourishment expresses the probability that a randomly selected individual from the country consumes an inadequate number of calories to cover his/her energy requirement, based on FAO standards (Figure A.31). During 2015–2017, this figure was around 7.4%, representing a steady increase since the early 2010s. This is lower than levels seen during the first decade of independence but an increase since the late 2000s, demonstrating that pockets of malnutrition persist in the country.

Figure A.31: Undernourished Population, Three-Year Average, Georgia, 2002–2017

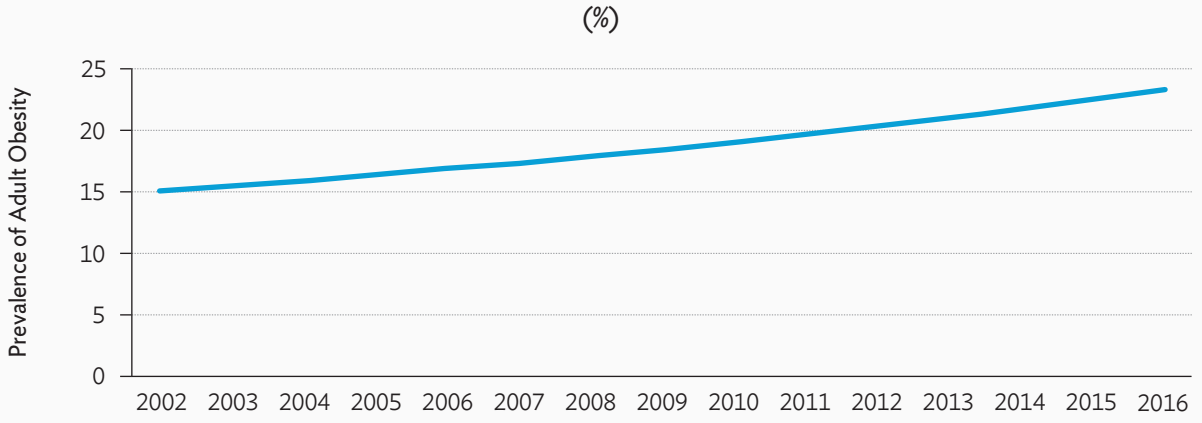
(%)



Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Obesity is an increasing problem in developing countries, including CAREC. Anthropometric data show that this has become a significant problem in Georgia. Obesity had been rapidly increasing, from 15.1% in 2002 to 23.3% in 2016 (Figure A.32). The prevalence of obesity is high compared with other CAREC countries and demonstrates the same upward long-term trend.

Figure A.32: Prevalence of Adult Obesity, Georgia, 2002–2016



Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Conclusions

Constraints

Georgia remains vulnerable to some problems that prevent the country from maximizing the potential of its agriculture sector. Local water resources are mainly sourced from rainfall and snowmelt, while external water resources are vulnerable to border disputes with neighboring countries, making the sector vulnerable to disruption of supplies. This may be more pronounced in the coming years, as the effects of climate change become more apparent. Irrigation facilities need to be improved or modernized as a countermeasure. The country's agrarian reforms have allowed free markets to flourish, but land remains highly fragmented. Farmers often lack technical knowledge and the entrepreneurial skills needed to create profitable enterprises. Technical extension services need to be developed to overcome this constraint.

Potential for Agricultural Development

Progress in terms of undernourishment has stalled since the late 2000s, emphasizing the need for development of its agriculture sector. Unlike other countries in the region, agriculture in Georgia did not demonstrate a clear recovery from the shocks of the 1990s. While Georgian agriculture is well regarded for select specialties such as wine, broader-based improvement of the sector is needed to address national food and nutrition demands. The stability of the agriculture sector is of paramount importance and will require improvements in and support to infrastructure including roads, storage facilities, machinery, and value chains.

KAZAKHSTAN

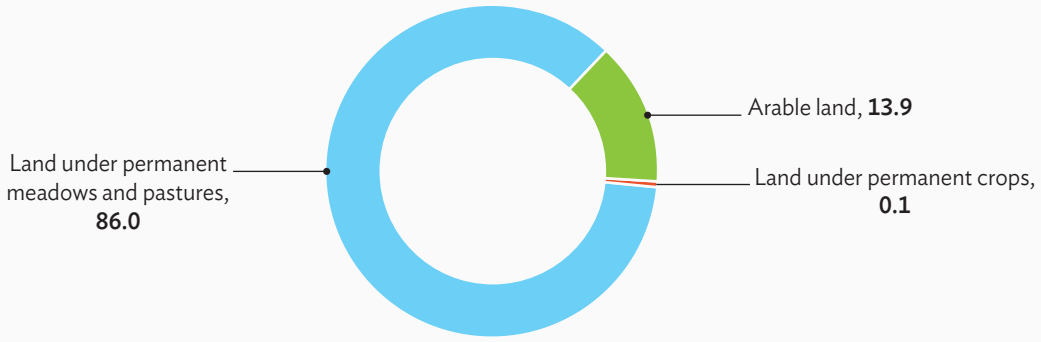
With a total population of 18.6 million (half of which reside in rural areas), Kazakhstan is an upper middle-income country and the largest economy in Central Asia and the South Caucasus region. It is the world's largest landlocked country with an area of about 272 million ha, sharing borders with the Russian Federation, the PRC, the Kyrgyz Republic, Uzbekistan, and Turkmenistan. Kazakhstan is an energy-rich country that primarily exports natural resources to global markets. Kazakhstan's policy makers have sought to diversify the economy to achieve greater sustainability, especially as fluctuations in global commodity markets have buffeted the economy since 2010. Agriculture has been relatively overlooked, as the government focused more on productive sectors during the early 21st century. However, agriculture can play an important role in developing a sustainable and diverse economy, as Kazakhstan has substantial natural endowments and growing financial power to invest in the sector.

Resource Endowment and Input Usage

Land Resources

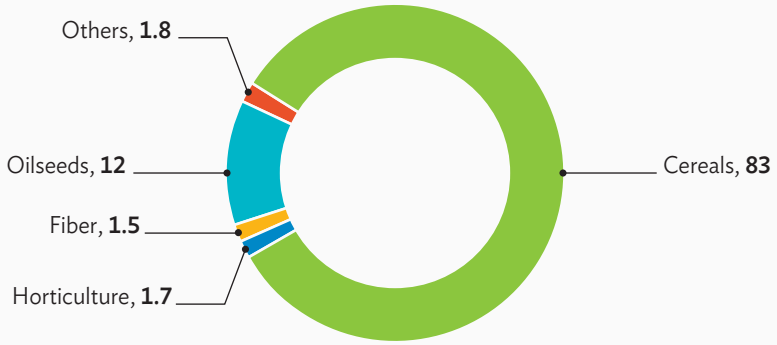
In 2016, some 80% (217 million ha) of Kazakhstan's land was utilized for agriculture. Of the total agricultural area, around 13.9% (30 million ha) is arable, 86.0% (187 million ha) is classified as permanent meadow and pasture, and 0.1% (130,000 ha) is categorized as having permanent or plantation crops (Figure A.33). Crops produced in Kazakhstan cover arable lands and lands classified as plantation crops. By major crop group, cereals occupy 83.0% of cropped areas, followed by oilseeds (12.0%), horticulture (1.7%), fiber crops (1.5%), and other crops (1.8%), as shown in Figure A.34.

Figure A.33: Agricultural Land Types, Kazakhstan, 2016
(%)



Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Figure A.34: Share of Cultivated Land by Crop Type, Kazakhstan, 2014
(%)



Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Water Resources

Kazakhstan has an annual water supply of around 64 billion m^3, of which around 57 billion m^3 is classified as internally produced surface water and 34 billion m^3 comes from internally produced groundwater, with an overlap of 26 billion m^3. The country's inland water resources originate from eight major water basins: (i) Syr Darya, (ii) Balkhash–Alakol, (iii) Chu–Talas–Assa, (iv) Irtysh River, (v) Ishim River, (vi) Nura–Sarysu, (vii) Tobol–Torgai, and (viii) Ural–Caspian Sea. Of Kazakhstan's 3.8 million ha of potentially irrigable land, only 2.1 million ha (roughly 55%) is currently developed for irrigation. In 2017, agriculture accounted for 67% of total water withdrawal, whereas industry accounted for about 26%.

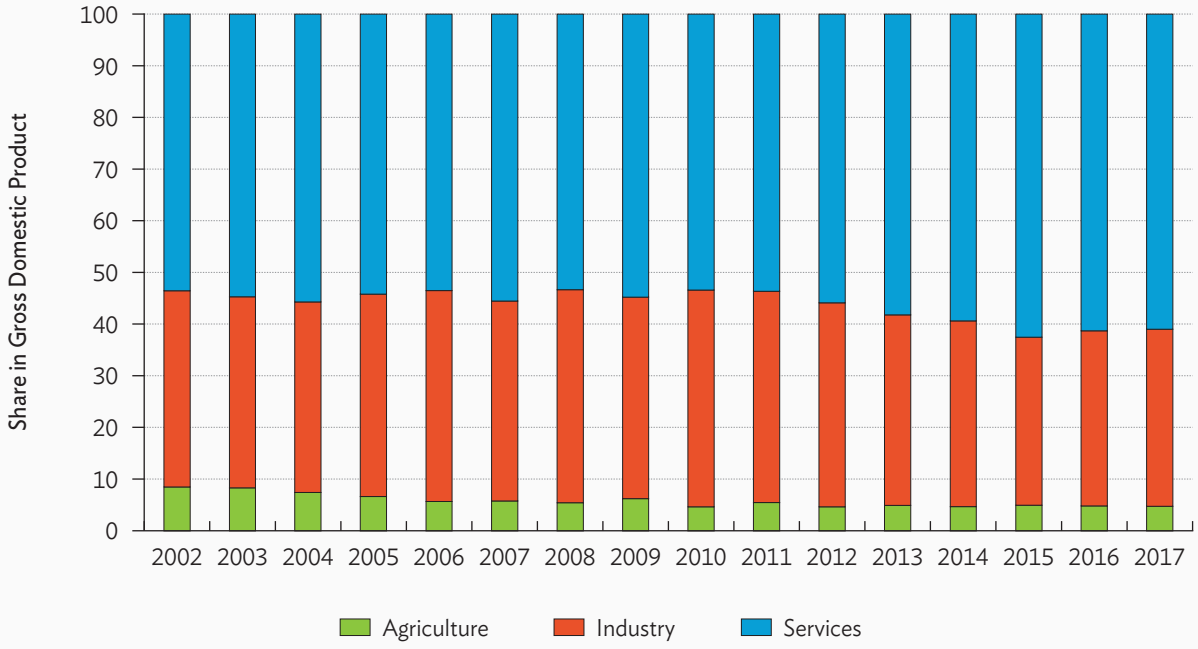
Agriculture and the Economy

Macroeconomic Trends

A relatively small portion of Kazakhstan's economy is generated from its agriculture sector. Agriculture's already small share in national output has remained steady, following a drop in the early to mid-2000s. In 2017, agriculture accounted for 4.7% of total GDP, compared with 6.2% in 2009, and 8.5% in 2002 (Figure A.35). Currently, the services sector is the largest contributor to national GDP and is continuing to grow. In 2016, total agricultural output was approximately $6.2 billion, compared with the national GDP of $135 billion. Kazakhstan's per capita GDP in 2016 was $7,505.

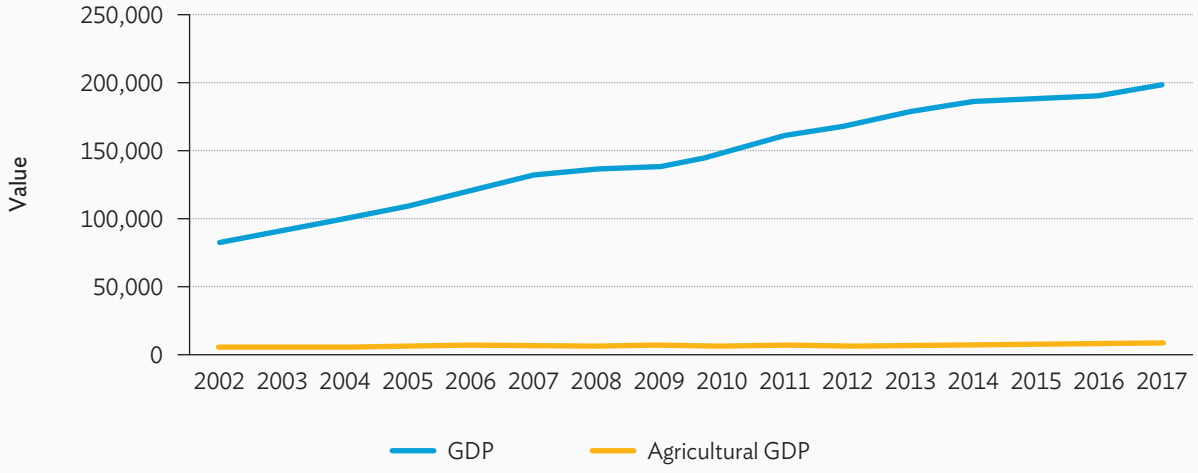
Figure A.36 illustrates the growth of national GDP compared with agricultural GDP that demonstrates a much slower rate of growth compared with other sectors of the economy.

Figure A.35: Share of Gross Domestic Product by Sector, Kazakhstan, 2002–2017
(%)



Source: Asian Development Bank.

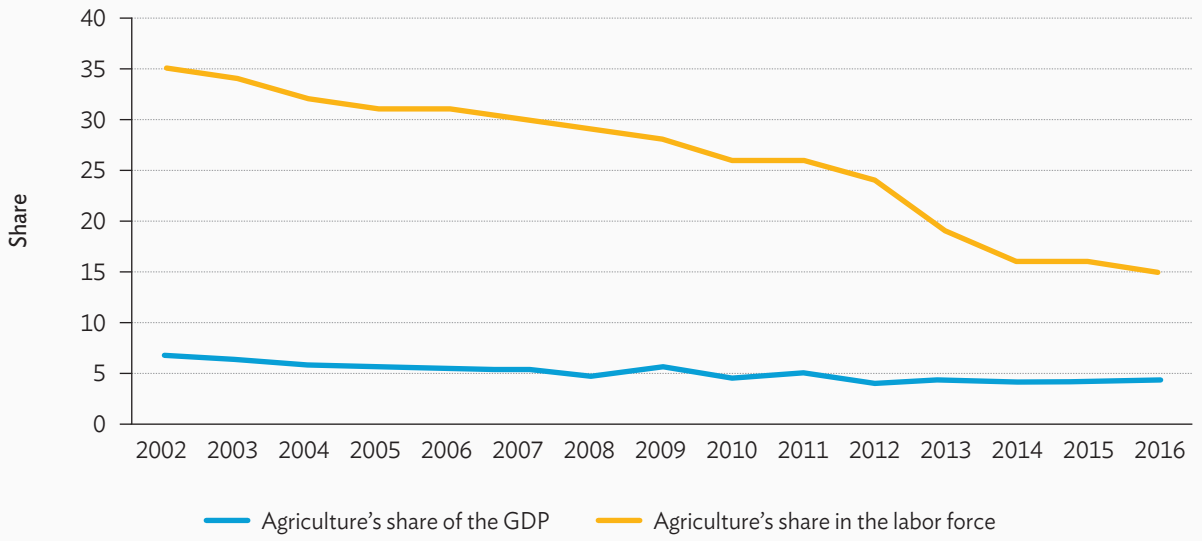
Figure A.36: Growth of Agricultural and Total Gross Domestic Product, Kazakhstan, 2002–2017
($ million, 2010 prices)



GDP = gross domestic product.

Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Figure A.37: Agriculture's Share of National Gross Domestic Product and Employed Labor Force, Kazakhstan, 2002–2016
(%)



GDP = gross domestic product.

Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Figure A.37 compares agriculture's share of the national GDP and its share of the employed labor force. The figures suggest an accelerating decline in agricultural labor, compared with other sectors since the mid-2010s, from 19% in 2013 to 15% in 2016. While there is still a significant gap between agriculture's share of labor and output, it appears that the two figures have been converging since 2014.

Agricultural Production

Approximately 56% of the country's agricultural production comes from cropping, compared with 44% from livestock. Beef was the most valuable commodity produced in Kazakhstan in 2016, totaling around $2.1 billion. Other important commodities included wheat ($1.6 billion), cow's milk ($1.3 million), sheep meat ($865 million), potatoes ($482 million), and tomatoes ($450 million). Wheat was the largest product with a total quantity of 15 million tons. Other important products included potatoes (3.5 million tons), barley (3.2 million tons), watermelons (1.2 million tons), and melons (898,000 tons). Around 127,000 tons of fertilizers were used in Kazakhstan in 2017, and a further 128,000 tons were imported into the country that year.

Agricultural Trade

Kazakhstan imported $3.0 billion worth of agricultural goods in 2016, compared with $2.1 billion in agricultural exports. Kazakhstan's main agricultural exports were wheat ($685 million), wheat flour ($505 million), barley ($109 million), linseed ($91 million), cotton lint ($72 million), and sunflower seeds ($55 million). Processed foods were Kazakhstan's key agricultural import at $197 million, followed by chocolate products ($151 million), raw sugar ($146 million), chicken meat ($130 million), sunflower oil ($93 million), and pastries ($88 million).

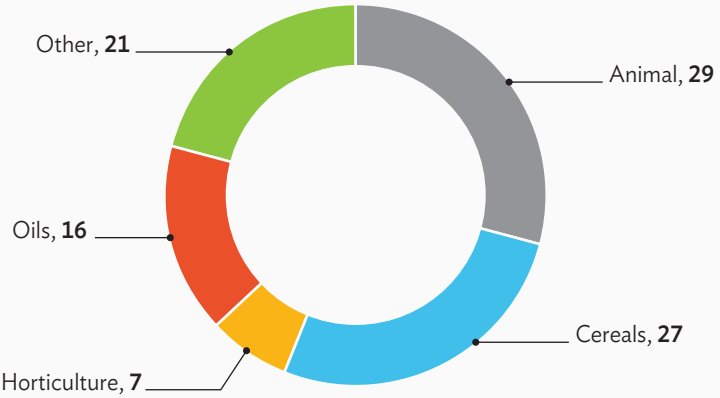
Food Security

Food Intake

The average daily per capita calorific intake was estimated at 3,264 kcal in 2013. Figure A.38 shows the proportion of calorific intake by each of the major food groups. Cereals accounted for 27% of daily calorie consumption in Kazakhstan during this time. Calorific intake from animal sources comprised 29%, while fruit and vegetables accounted for 7%. The average daily per capita consumption of protein was estimated at 96.4 grams, while the average dietary energy supply adequacy was estimated to be 138% in 2015–2017, representing a steady long-term increase.

Figure A.38: Share of Daily Kilocalorie per Capita by Food Group, Kazakhstan, 2013

(%)



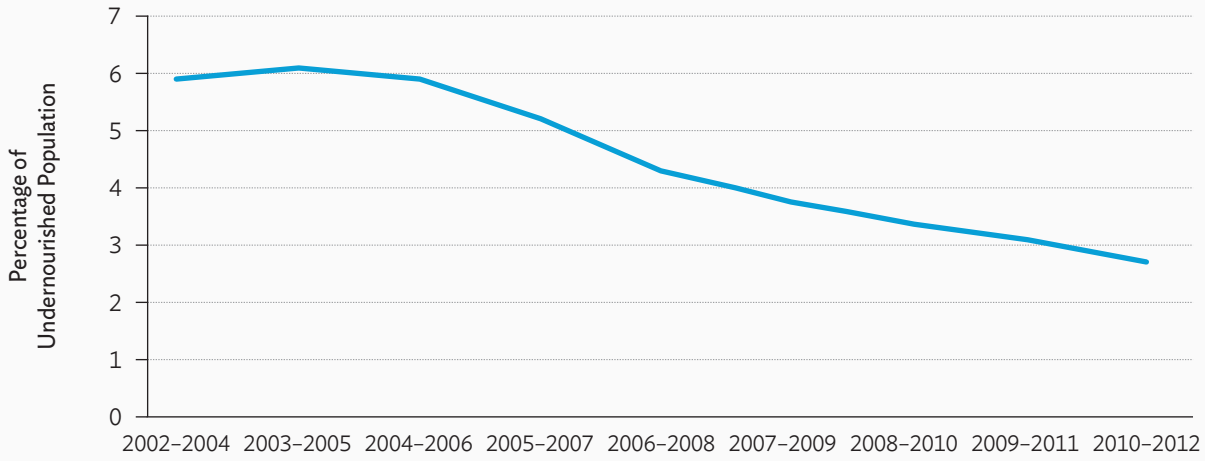
Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Malnutrition

Figure A.39 shows the medium-term trend of undernourishment in Kazakhstan. The prevalence of undernourishment expresses the probability that a randomly selected individual from the country consumes an inadequate number of calories to cover his/her energy requirement, based on FAO standards.

Figure A.39: Undernourished Population, Three-Year Average, Kazakhstan, 2002–2012

(%)

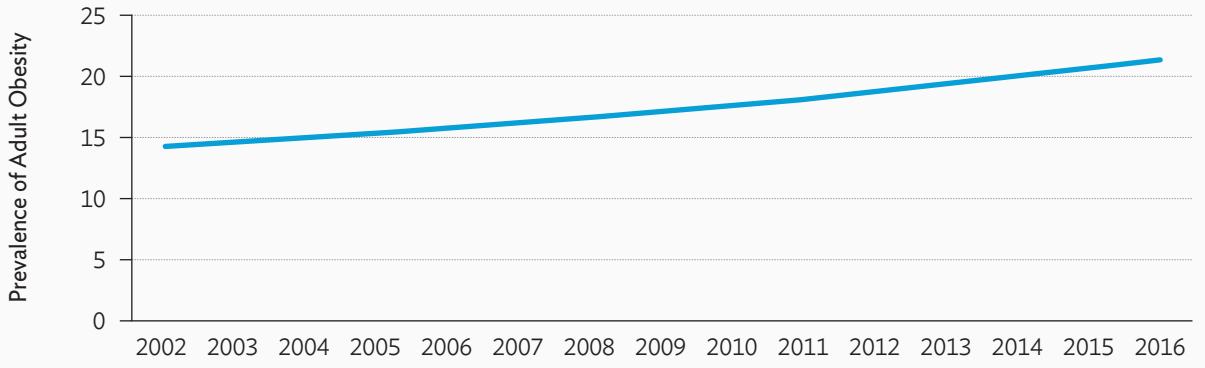


Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Obesity is an increasing problem in developing countries, including CAREC. Anthropometric data show that this has become a significant problem in Kazakhstan. Obesity had been rapidly increasing, from 14.3% in 2002 to 21.3% in 2016 (Figure A.40). The prevalence of obesity is high compared with other CAREC countries and demonstrates the same upward long-term trend.

Figure A.40: Prevalence of Adult Obesity, Kazakhstan, 2002–2016

(%)



Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Conclusions

Constraints

Kazakhstan's agriculture sector has considerable potential but faces several challenges. Despite being one of the world's major producers of wheat, Kazakhstan has inadequate transport systems and infrastructure that link production areas to major markets. For years, Kazakhstan was served by a single seaport at Aktau on the Caspian Sea, though the recent construction of a new port at Kuryk and the expansion of the Aktau Port have increased capacity. The country's agriculture sector needs investment in technical know-how and machinery. Climate change threatens the future of the sector, adding to the problems of land degradation through overgrazing and poor water management. Farmers need increased access to financial resources that will help them purchase high-quality inputs and develop their land. Kazakhstan's agricultural productivity has improved in recent years, and benefits from its productivity improvement may spill over to other sectors of the economy.

Potential for Agricultural Development

Developing existing water resources can help Kazakhstan maximize its efficiency and promote on-farm productivity. Kazakhstan has developed the economic resources to invest in agriculture, and policy makers must view the sector as a growth opportunity. As the country attempts to diversify its economy and reduce its exposure to global commodity price fluctuations, revitalizing national agriculture is one way to achieve that goal. The country has become an important supplier of wheat to the region, and increased connectivity through transport infrastructure may realize additional benefits.

KYRGYZ REPUBLIC

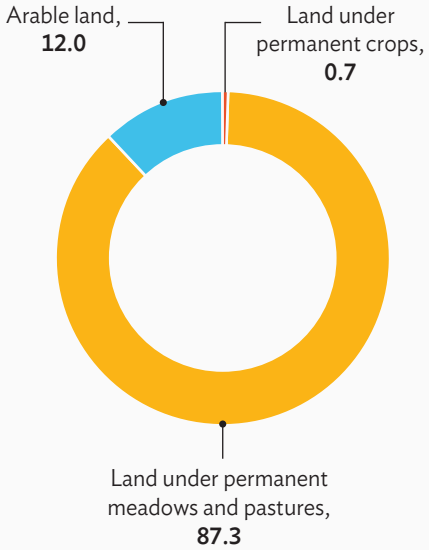
With a total population of 6.2 million (of which 4 million or 64% reside in rural areas), the Kyrgyz Republic is a landlocked country bordered by Kazakhstan to the north, Uzbekistan to the west, Tajikistan to the southwest, and the PRC to the east. It has extensive mountainous terrain and limited natural resources that pose a challenge to agricultural development. The Kyrgyz Republic has suffered from episodes of political instability in the past, and economic growth has lagged behind other countries in the region. It continues to be vulnerable to various environmental, political, and economic shocks. The country needs policy interventions that can stimulate sustainable development of its agriculture sector.

Resource Endowment and Input Usage

Land Resources

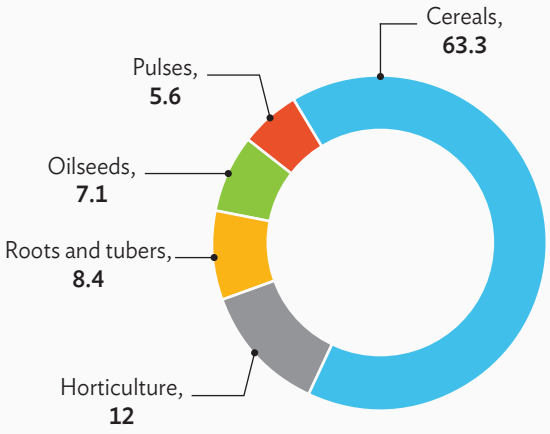
In 2016, about 53% (10.5 million ha) of the Kyrgyz Republic's land was utilized for agriculture. Of the total agricultural area, around 12% (1.3 million ha) is arable, 87% (9.2 million ha) is classified as permanent meadow and pasture, while 0.7% (73,500 ha) is planted with permanent or plantation crops (Figure A.41). Crops produced in the Kyrgyz Republic include cereals (63.3% of the cropped area), followed by horticulture (12.0%), roots and tubers (8.4%), oilseed crops (7.1%), pulses (5.6%), fiber crops (2.5%), and other crops (1.1%) (Figure A.42).

Figure A.41: Agricultural Land Types, Kyrgyz Republic, 2016
(%)



Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Figure A.42: Share of Cultivated Land by Crop Type, Kyrgyz Republic, 2014
(%)



Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Water Resources

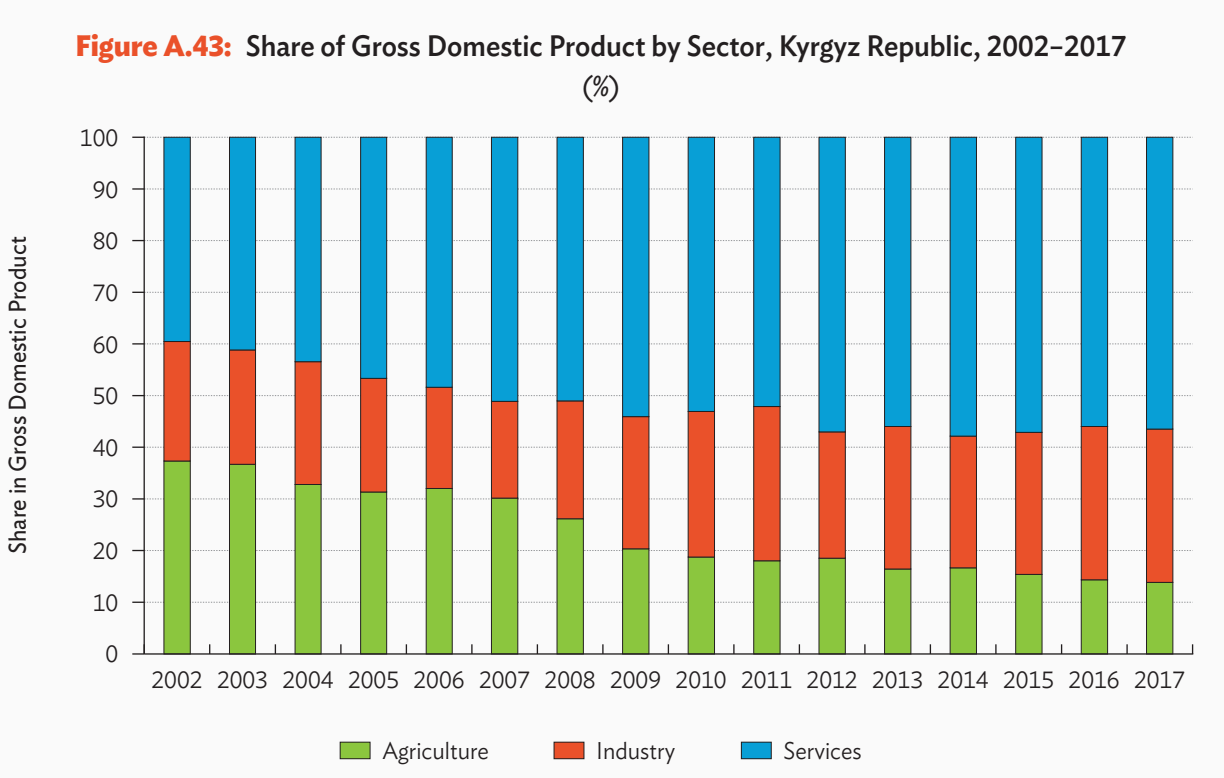
The Kyrgyz Republic is the only country in Central Asia where water resources are almost fully sourced within its territory. It has considerable water and hydropower resources. It has an annual water supply of around 49 billion m^3, of which around 46 billion m^3 is classified as internally produced surface water and 14 billion m^3 comes from internally produced groundwater, with an overlap of 11 billion m^3. The country's inland water resources originate from six major river basins: (i) Issyk-Kul, (ii) Chu–Talas–Assa, (iii) southeastern river basin, (iv) Amu Darya, (v) Syr Darya, and (vi) Chatkal. Of the Kyrgyz Republic's 2.2 million ha of potentially irrigable land, only 1.0 million ha (roughly 46%) is currently developed with irrigation facilities. According to the Department of Water Resources and Land Improvement under the Ministry of Agriculture, irrigated agriculture accounted for 90% of total water utilization in 2017.

Agriculture and the Economy

Macroeconomic Trends

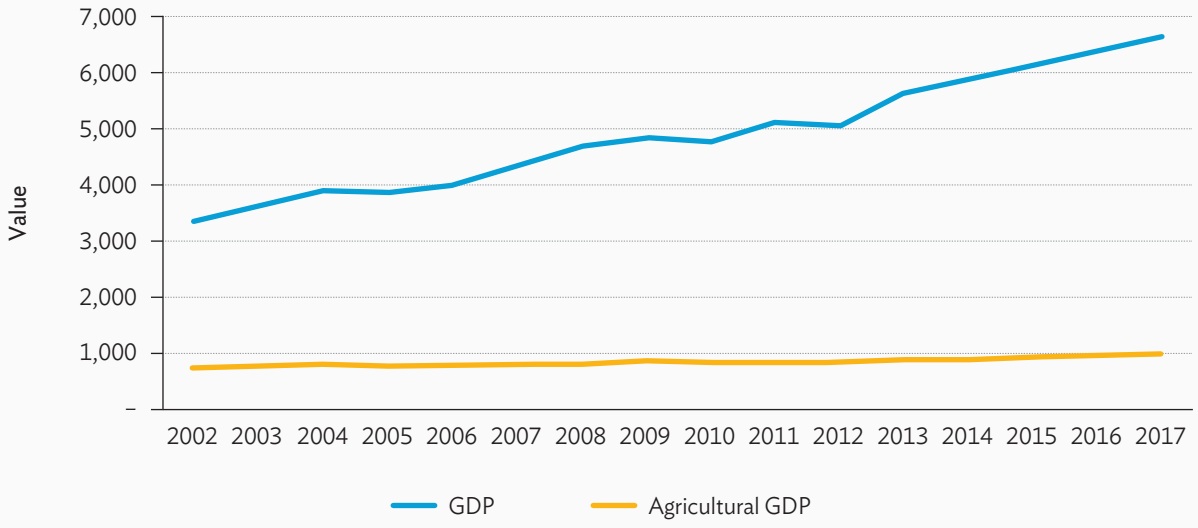
A significant but declining portion of the Kyrgyz Republic's economy is derived from agriculture. Agriculture's share of national output has declined since 2000s, most sharply in the latter half of the 2000s. In 2017, agriculture accounted for 13.8% of national GDP, compared with 20.3% in 2009 and 37.3% in 2002 (Figure A.43). As of 2019, the services sector is the largest contributor to national GDP. In 2016, total agricultural output was approximately $867 million, compared with the national GDP of $6.6 billion. The Kyrgyz Republic's per capita GDP in 2016 was $1,100.

Figure A.43: Share of Gross Domestic Product by Sector, Kyrgyz Republic, 2002–2017



Source: Asian Development Bank.

Figure A.44: Growth of Agricultural and Total Gross Domestic Product, Kyrgyz Republic, 2002–2017
($ million, 2010 prices)



GDP = gross domestic product.

Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Figure A.44 shows the growth of national GDP and agricultural GDP, highlighting the significantly slower growth rate for agricultural GDP compared with other sectors of the economy.

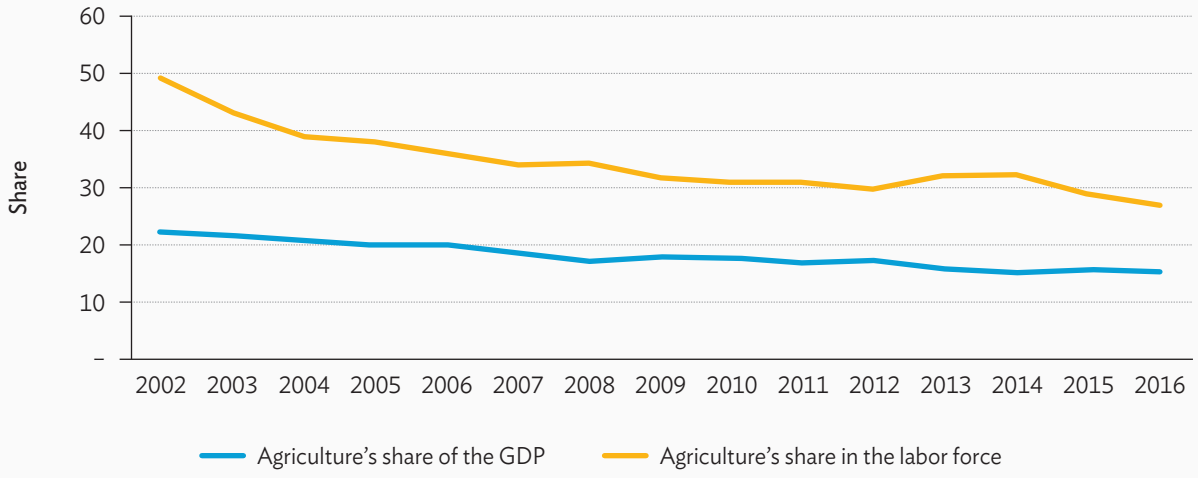
Figure A.45 compares agriculture's share of national GDP and its share of the employed labor force. It suggests a proportional decrease in agricultural labor compared with other sectors since the early 2000s, from 49.1% in 2002 to 26.8% in 2016. While there is still a significant gap between agriculture's share of labor and output, it appears that the two figures have been declining in parallel in recent years, suggesting that other sectors are absorbing agricultural labor.

Agricultural Production

Approximately 45% of agricultural output comes from the cropping subsector, compared with 55% from livestock. Beef was the single most valuable commodity produced in the Kyrgyz Republic in 2016, valued at around $785 million. Other important commodities included sheep meat ($502 million), cow's milk ($418 million), potatoes ($224 million), maize ($114 million), and wheat ($112 million). Potatoes were the largest crops at 1.4 million tons. Other important products included sugar beet (705,000 tons), wheat (662,000 tons), maize (649,000 tons), and barley (415,000 tons). Around 40,000 tons of fertilizers were used in the Kyrgyz Republic in 2017, and a further 29,000 tons were imported into the country that year.

Figure A.45: Agriculture's Share of National Gross Domestic Product and Employed Labor Force, Kyrgyz Republic, 2002–2016

(%)



GDP = gross domestic product.

Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Agricultural Trade

The Kyrgyz Republic imported $456 million worth of agricultural goods in 2016, compared with $168 million of agricultural exports. The Kyrgyz Republic's main agricultural export commodities were beans ($55 million), cotton lint ($19 million), dried fruit ($14 million), butter ($7.6 million), cheese ($5.0 million), and cow's milk ($3.5 million). Chocolate products were the Kyrgyz Republic's key food import valued at $42 million. It was followed by sunflower oil ($37 million), wheat ($32 million), sugar ($25 million), processed foods ($25 million), and baby food ($18 million).

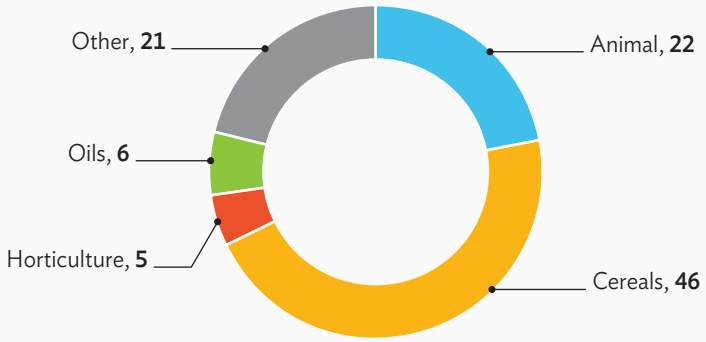
Food Security

Food Intake

The average daily per capita calorific intake was estimated at 2,817 kcal in 2013. Figure A.46 reports the proportion of daily calorific intake contributed by each of the major food groups. Cereals accounted for 46% of daily calorific intake, while the equivalent from animal sources was 22% and from fruit and vegetables 5%. The average daily per capita protein consumption was estimated at 85.2 grams, whereas the average dietary energy supply adequacy was estimated to be 120% in 2015–2017, representing a gradual long-term increase.

Figure A.46: Share of Daily Kilocalorie per Capita by Food Group, Kyrgyz Republic, 2013

(%)



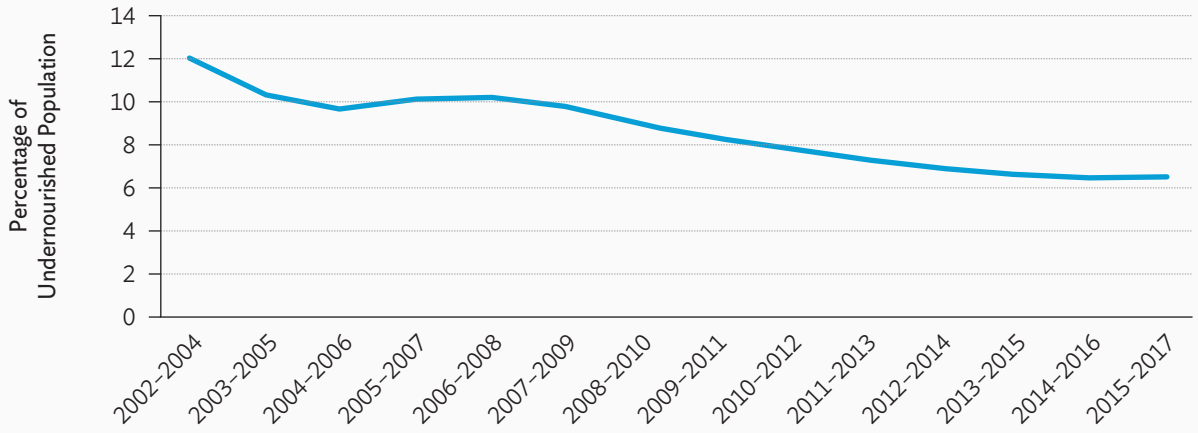
Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Malnutrition

Figure A.47 presents the medium-term trend of undernourishment in the Kyrgyz Republic. The prevalence of undernourishment expresses the probability that a randomly selected individual from the country consumes an inadequate number of calories to cover his/her energy requirement, based on FAO criteria. During 2015–2017, this figure was 6.5%, representing a steady decrease since the early 2010s. This is a significant decrease from levels seen in the early 2000s when the prevalence of undernourishment was over 12%.

Figure A.47: Undernourished Population, Three-Year Average, Kyrgyz Republic, 2002–2017

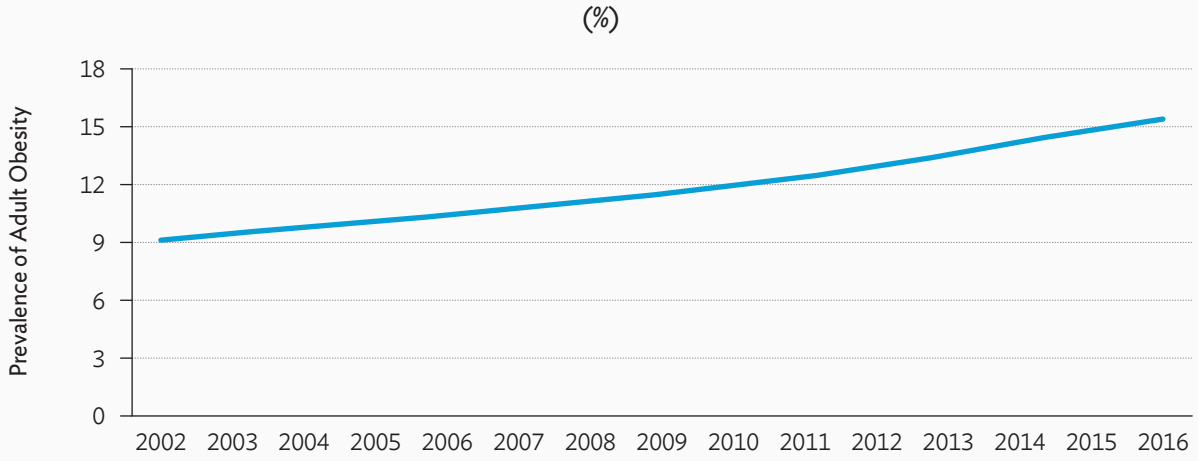
(%)



Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Obesity is an increasing problem in developing countries, including CAREC. Anthropometric data show that this has become a significant problem in the Kyrgyz Republic. Obesity had been rapidly increasing from 9.2% in 2002 to 15.4% in 2016 (Figure A.48). The prevalence of obesity is moderately high compared with other CAREC countries and demonstrates the same upward long-term trend.

Figure A.48: Prevalence of Adult Obesity, Kyrgyz Republic, 2002–2016



Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Conclusions

Constraints

The Kyrgyz Republic's agriculture sector has considerable potential but simultaneously faces significant challenges. Although the Kyrgyz Republic implemented land reform soon after independence and has created one of the most liberalized political systems in the region, its agriculture sector has lagged in terms of productivity. Land fragmentation without the development of necessary support services and improvements in governance is a considerable hurdle to agricultural growth. Farmers lack knowledge of modern production techniques and require extension services and technology transfers to make use of the country's potential. Although the country has abundant water resources, it faces challenges in terms of land availability, land degradation, and limited rural infrastructure.

Potential for Agricultural Development

The Kyrgyz Republic's agriculture requires considerable investment, especially in support services and infrastructure to help its large smallholder farmers to make productivity gains. With its entry into the Eurasian Economic Union, the Kyrgyz Republic has theoretical access to a large market. However, without parallel improvements in regulatory services, transportation, and processing facilities, it will struggle to take advantage of this opportunity.

MONGOLIA

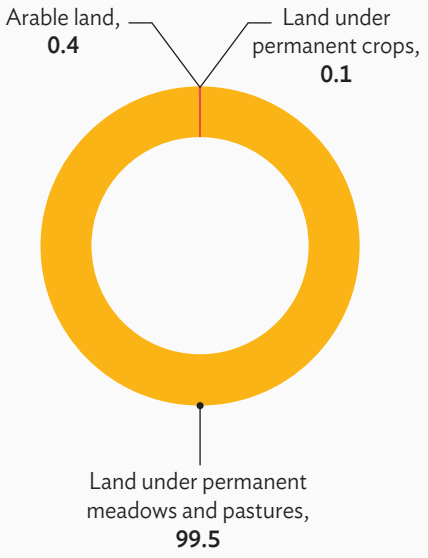
With a total population of 3.2 million (of which 860,000 or 27% reside in rural areas), Mongolia is a landlocked country in East Asia between the PRC to the south and the Russian Federation to the north. Agriculture, minerals, natural resources, and the services sectors have been major contributors to the country's growth. However, agricultural development is particularly vulnerable to harsh weather and external shocks, making government support and sustainable practices important for this sector.

Resource Endowment and Input Usage

Land Resources

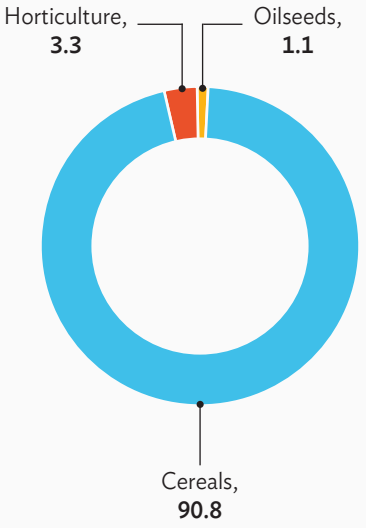
As of 2016, roughly 71.5% (111.1 million ha) of Mongolia's land is utilized for agriculture. Out of the total agricultural area, around 0.4% (444,400 ha) is arable, 99.5% (110.5 million ha) is classified as permanent meadow and pasture, and only 0.1% (110,000 ha) is used for cultivating perennial crops (Figure A.49). Crops produced in Mongolia include cereals (90.8% of the cropped areas), followed by horticulture (3.3%), oilseeds (1.1%), and other crops (4.8%) (Figure A.50).

Figure A.49: Agricultural Land Types, Mongolia, 2016
(%)



Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Figure A.50: Share of Cultivated Land by Crop Type, Mongolia, 2014
(%)



Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Water Resources

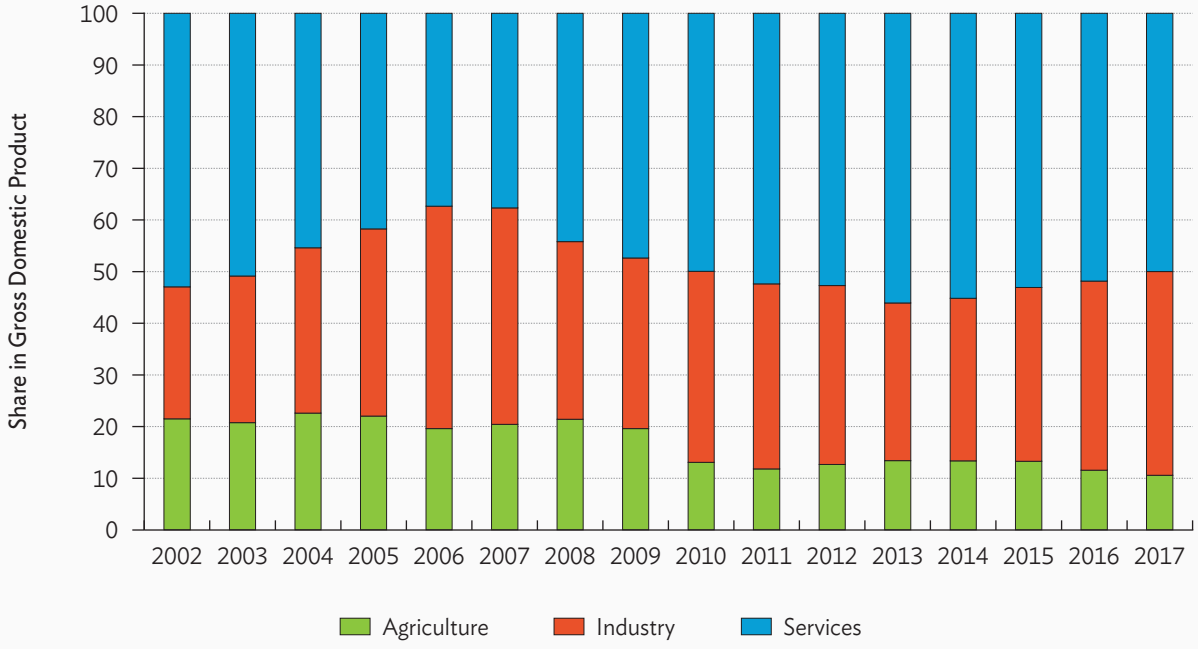
Mongolia has an annual water supply of around 35 billion m^3, of which around 33 billion m^3 is considered internally produced surface water and 6.1 billion m^3 comes from internally produced groundwater, with an overlap of 4 billion m^3. Mongolia is situated within three international river basins including the Arctic Ocean Basin, the Pacific Ocean Basin, and the Central Asian Internal Drainage Basin. There are over 4,000 rivers in Mongolia, with a combined length of 67,000 km. Of Mongolia's 518,000 ha of potentially irrigable land, only 84,000 ha (roughly 14%) are developed for irrigation. Currently, agriculture is the largest water user in the country, with irrigation consuming 30.0% and livestock 23.5% of available water. Mining consumes about 12.7% of available water (a figure that is rapidly increasing).

Agriculture and the Economy

Macroeconomic Trends

A relatively small portion of Mongolia's GDP is generated from its agriculture sector. Agriculture's already small share in national output has decreased in recent years due to the rapid growth in mining and the services sector. In 2017, agriculture accounted for 10.6% of total GDP, compared with 20.5% in 2007 and 21.5% in 2002 (Figure A.51). Currently, the service sector is the largest contributor to national GDP. In 2017, total agricultural output was approximately $10.6 billion, compared with the national GDP of $111.6 billion. Mongolia's per capita GDP in 2017 was 3,687.

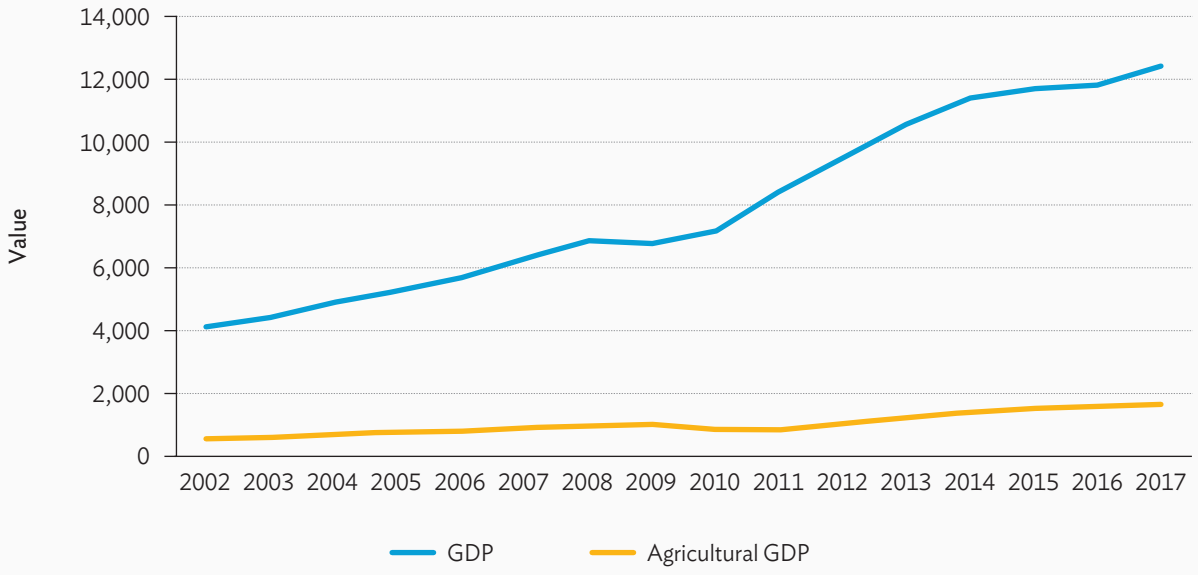
Figure A.51: Share of Gross Domestic Product by Sector, Mongolia, 2002–2017



Source: Asian Development Bank.

Figure A.52 reports the growth of national GDP compared with its agricultural GDP, demonstrating the sluggish growth of the latter when compared with other sectors of the economy.

Figure A.52: Growth of Agricultural and Total Gross Domestic Product, Mongolia, 2002–2017
($ million, 2010 prices)



GDP = gross domestic product.

Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

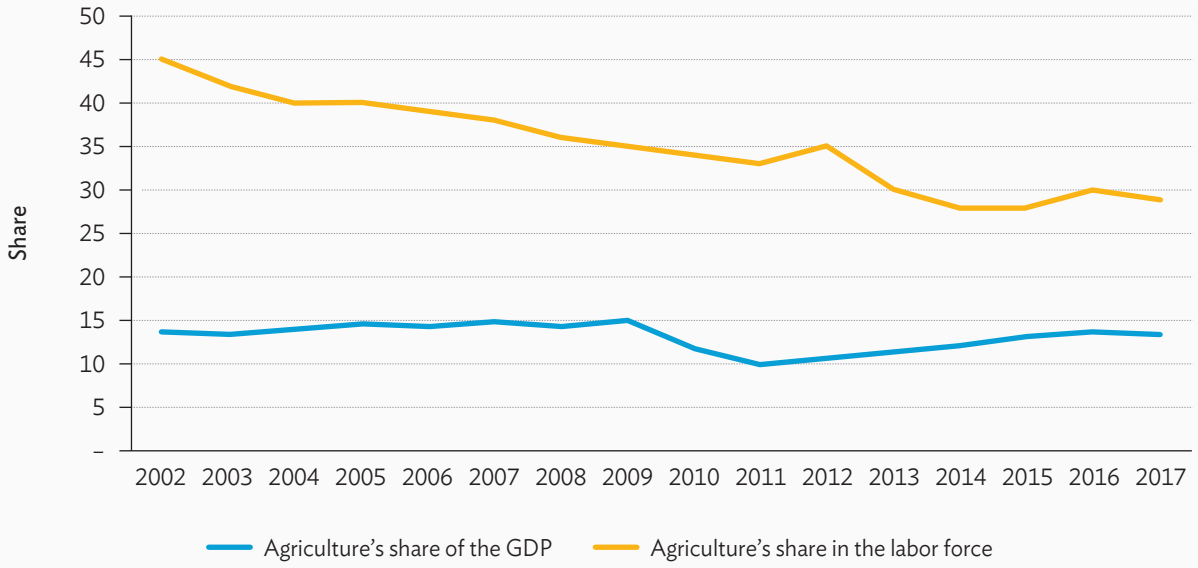
Figure A.53 compares agriculture's share of the national GDP and its share of the employed labor force. Data suggest a continual and steady decline in agricultural labor compared with other sectors since the early 2000s, from 44.9% in 2002 to 28.8% in 2017. It also shows that agriculture's share in GDP has fallen roughly in parallel to its share in labor, though a wide gap persists between the two figures.

Agricultural Production

Approximately 74.8% of agricultural output is derived from livestock, compared with 25.2% from the crops subsector. Sheep meat was the single most valuable commodity produced in Mongolia in 2016 at around $381 million. Other important commodities produced included beef ($303 million), cow's milk ($220 million), goat's milk ($101 million), and wheat ($92 million). The main commodities produced included milk (excluding butter) estimated at 510,000 tons. Other important products included wheat and wheat products (368,000 tons), potatoes and potato products (192,000 tons), sheep and goat meat (157,000 tons), and vegetables (93,000 tons). Around 22,670 tons of fertilizers were used in Mongolia in 2016, all of which were imported.

Figure A.53: Agriculture's Share of National Gross Domestic Product and Employed Labor Force, Mongolia, 2002–2017

(%)



GDP = gross domestic product.

Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Agricultural Trade

Mongolia imported $505 million worth of agricultural goods in 2016, compared with $368 million in agricultural exports. Mongolia's main agricultural export commodities in 2016 were cashmere ($212 million), nuts ($33 million), rapeseed ($16 million), wool ($16 million), crude materials ($15 million), and horse meat ($14 million). Processed food was Mongolia's key agricultural import valued at $57 million, followed by chocolate products ($39 million), wheat ($33 million), raw sugar ($26 million), and confectioners' sugar ($24 million).

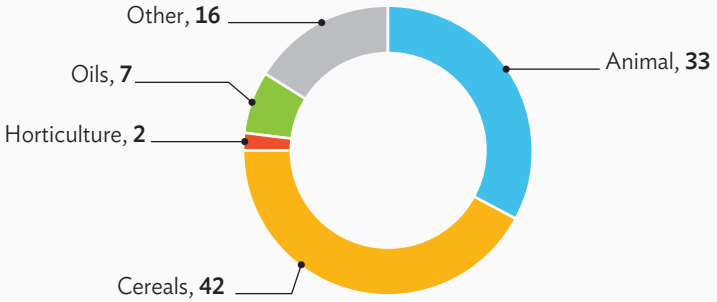
Food Security

Food Intake

The average daily per capita calorific intake was estimated at 2,510 kcal in 2013. Figure A.54 presents the proportion of daily calorific intake contributed by each of the major food groups. Cereals accounted for 42.4% of daily calorific intake in 2013. The calorific intake from animal sources comprised 33.1%, while fruit and vegetables accounted for 2.0%. The average daily per capita protein intake was estimated at 80.8 grams in 2013, while in 2015–2017, the average dietary energy supply adequacy was estimated to be 106%, representing a sharp increase since the early 2000s.

Figure A.54: Share of Daily Kilocalorie per Capita by Food Group, Mongolia, 2013

(%)



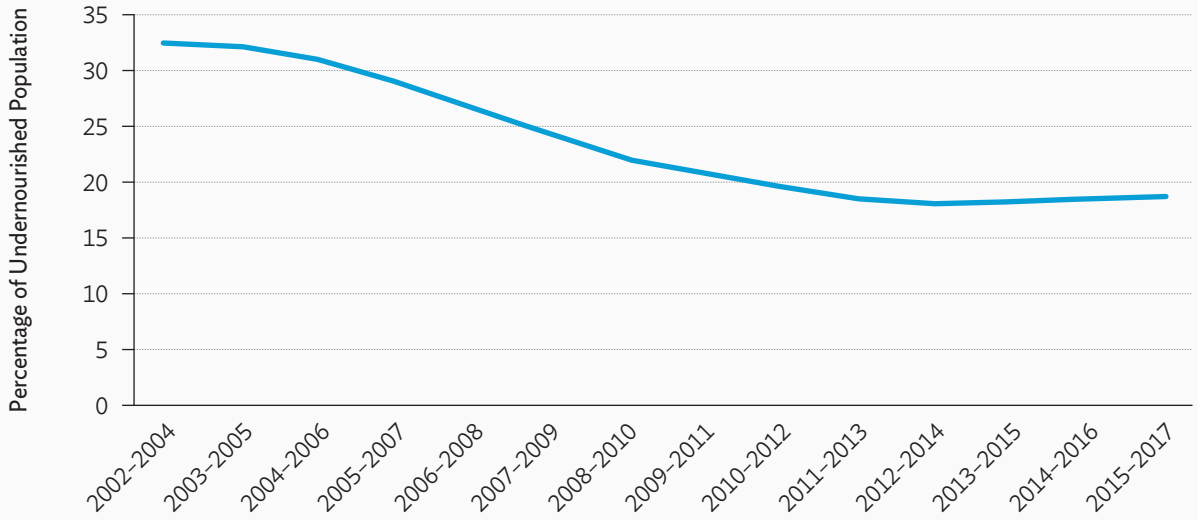
Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Malnutrition

The prevalence of undernourishment expresses the probability that a randomly selected individual from the country consumes an inadequate number of calories to cover his/her energy requirement, based on FAO criteria (Figure A.55). During 2015–2017, this figure was around 18.7%, representing steady levels since the early 2010s although a drastic decrease from levels seen during the early 2000s, when more than 30 % of the population experienced undernourishment.

Figure A.55: Undernourished Population, Three-Year Average, Mongolia, 2002–2017

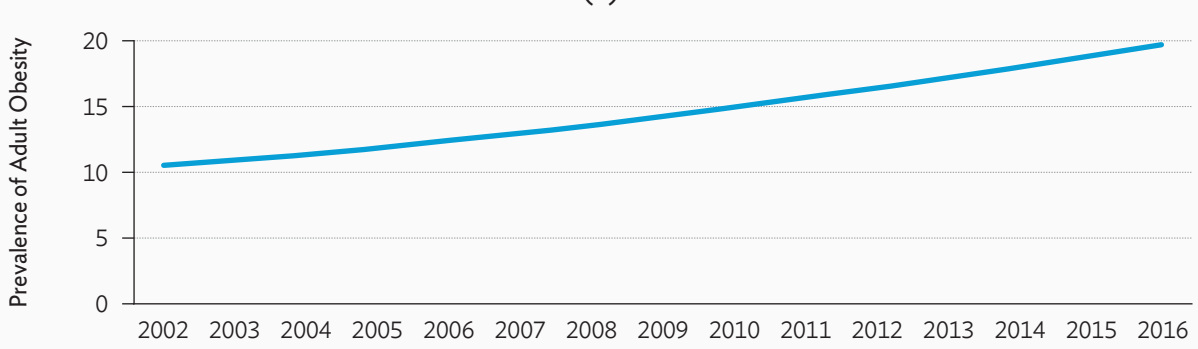
(%)



Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Obesity is an increasing problem in developing countries, including CAREC. Anthropometric data show that this has become a significant problem in Mongolia. Obesity has been steadily increasing, from 10.5% in 2002 to 19.6% in 2016 (Figure A.56). The prevalence of obesity is moderately high compared with other CAREC countries and demonstrates the same upward long-term trend due in part to the amount of animal fats consumed in traditional Mongolian diets.

Figure A.56: Prevalence of Adult Obesity, Mongolia, 2002–2016



Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Conclusions

Constraints

Although Mongolia has a large land area, much of it is unsuited for agricultural production. Arable land accounts for less than 0.5% of its agricultural land and pastureland, the latter being in decline from overgrazing. Mongolia's extreme climate poses additional risks for agricultural producers, and natural resources were heavily exploited during the transition to a market-based economy. Moreover, Mongolia's farmers generally lack technical knowledge and access to market information to create profitable farms or enterprises. Addressing these issues and improving domestic infrastructure can create opportunities for Mongolian agriculture and help expand the range and variety of its trade activities.

Potential for Agricultural Development

Sustainable development of Mongolia's agriculture sector can help address some of the constraints and counteract the negative impacts of previous practices. Developing Mongolia's agricultural value chains can help modernize the country's important livestock sector and provide additional opportunities for exports, especially as neighboring countries become more prosperous and demand more animal-based food products. Value chain development relates not only to physical infrastructure such as transportation and storage but also to the regulatory and certification regimes that will allow Mongolian exports to access new markets. Further investments in machinery and irrigation (with the view to improve fodder production to feed animals during the severe winters) can also help Mongolia maximize its scarce land resources.

PAKISTAN

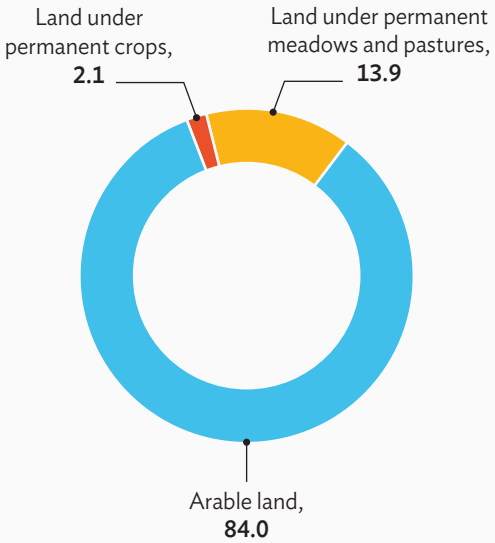
With a total population of about 204 million (of which 122 million or 60 % live in rural areas), Pakistan is a lower middle-income country with a large agriculture sector. Afghanistan borders it to the northwest, Iran to the west, India to the east, and the PRC to the northeast. It contains vast natural resources but is vulnerable to various environmental, political, and economic shocks. Pakistan has suffered from episodes of political instability and natural disasters that hindered agriculture production in certain regions. Despite these challenges, Pakistan is among the world's leading agricultural producers in some food items.

Resource Endowment and Input Usage

Land Resources

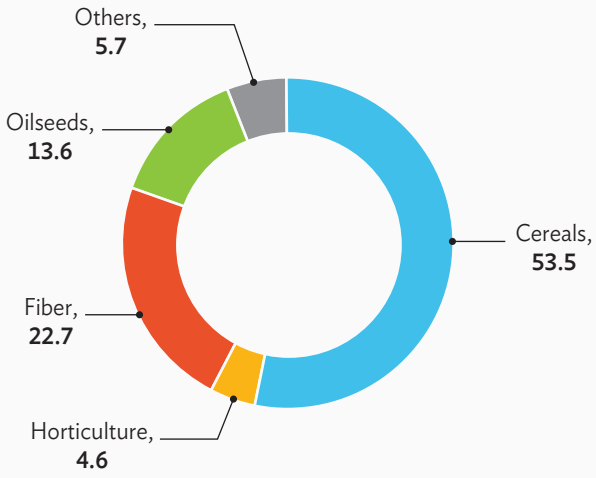
In 2016, about 42% (37 million ha) of Pakistan's land was utilized for agriculture. Of the total agricultural area, around 84% (31 million ha) is arable, 14% (5.1 million ha) is classified as permanent meadow and pasture, and 2.1% (780,000 ha) is planted with permanent (perennial) or plantation crops (Figure A.57). Crops produced in Pakistan include cereals (53.5% of the cropped area), followed by fiber crops (22.7%), oilseeds (13.6%), horticulture (4.6%), and other crops (5.7%) (Figure A.58).

Figure A.57: Agricultural Land Types, Pakistan, 2016
(%)



Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Figure A.58: Share of Cultivated Land by Crop Type, Pakistan, 2014
(%)



Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Water Resources

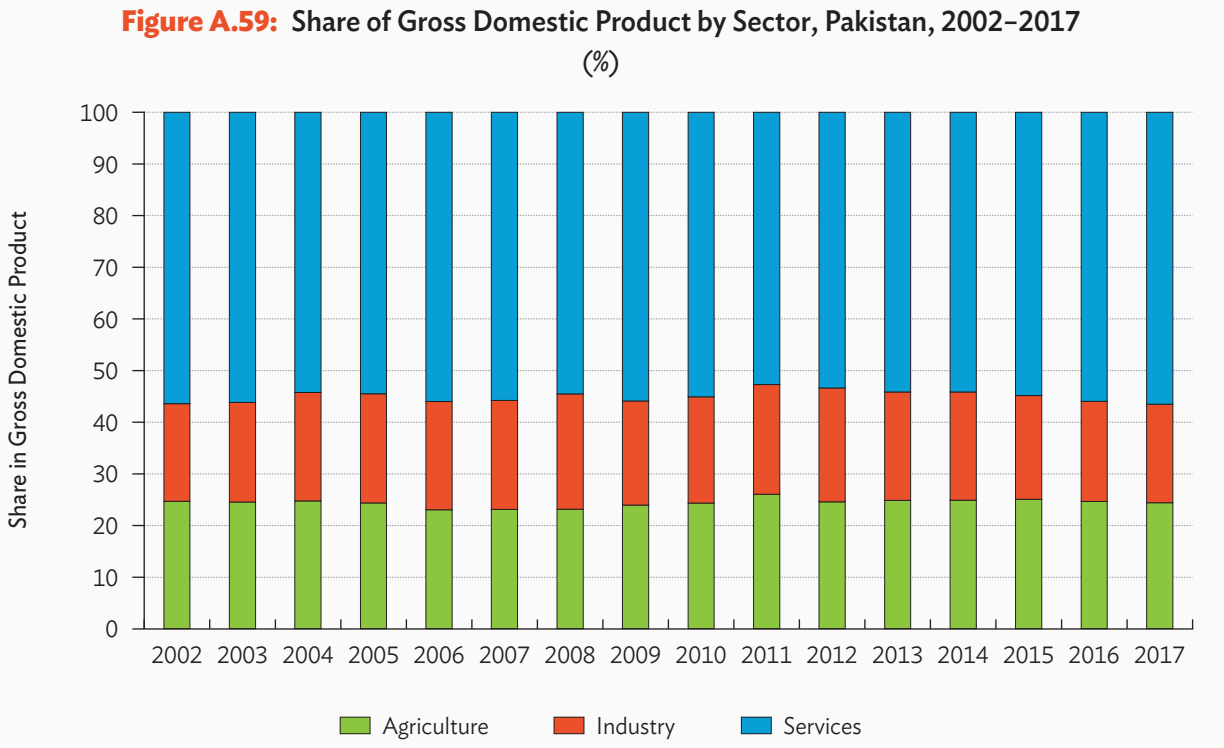
Pakistan has an annual water supply of around 55 billion m^3, of which around 47 billion m^3 is classified as internally produced surface water and 55 billion m^3 comes from internally produced groundwater, with an overlap of 47 billion m^3. Surface water and groundwater are primarily replenished from rainfall and runoff from the Indus River Basin that extends across 80% of Pakistan's arable land. It also irrigates roughly 52% of the country's agricultural area. Of Pakistan's 21.3 million ha of potentially irrigable land, around 20 million ha (roughly 94%) is currently developed with irrigation facilities. Agriculture accounted for 94% of total water utilization in 2008 (more recent data were not available).

Agriculture and the Economy

Macroeconomic Trends

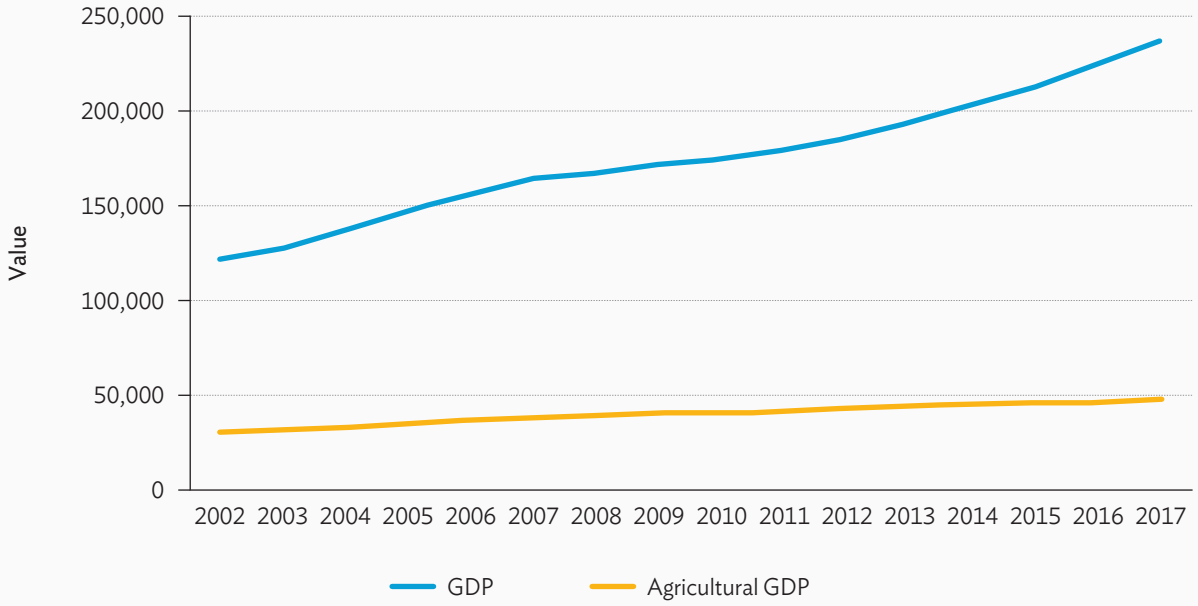
A significant portion of Pakistan's economy is derived from its agriculture sector. Agriculture's share of national output has remained constant since 2000, even though it was previously higher. In 2017, agriculture accounted for 24.4% of its national GDP (Figure A.59). Currently, the services sector is the largest contributor to national GDP. In 2016, total agricultural output was approximately $67 billion, compared with the national GDP of $283 billion. Pakistan's per capita GDP in 2016 was $1,462.

Figure A.59: Share of Gross Domestic Product by Sector, Pakistan, 2002–2017



Source: Asian Development Bank.

Figure A.60: Growth of Agricultural and Total Gross Domestic Product, Pakistan, 2002–2017
($ million, 2010 prices)



GDP = gross domestic product.

Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

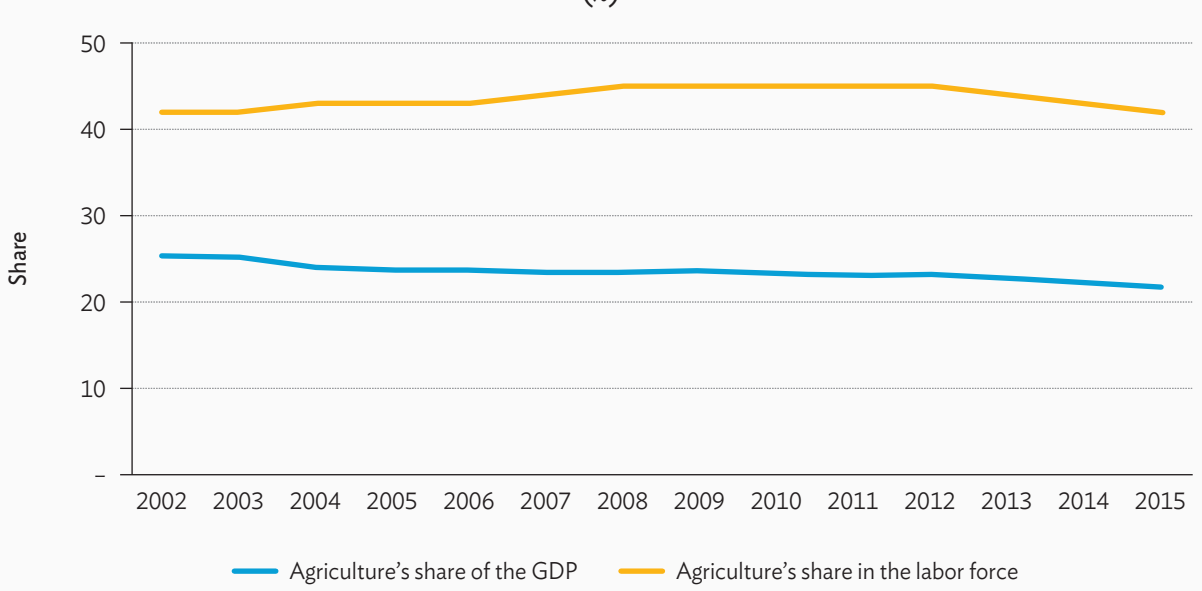
Figure A.60 shows the growth of national GDP and the country's agricultural GDP, highlighting the significantly slower growth rate of agriculture compared with other sectors.

Figure A.61 compares agriculture's share of national GDP and its share of the employed labor force. The figures suggest little structural transformation among major economic sectors over this period. While there is still a significant gap between agriculture's share of labor and output, it appears that the two figures have remained steady.

Agricultural Production

Approximately 46% of agricultural production comes from the cropping sector, compared with 54% from livestock. Buffalo meat was the single most valuable commodity produced in Pakistan in 2016 at around $9.8 billion. Other important commodities produced included buffalo's milk ($9.4 billion), wheat ($7.4 billion), beef ($5.5 billion), cotton ($3.3 billion), and chicken meat ($3.2 billion). Sugarcane was the largest crop produced with 65 million tons in 2016. Other important products included wheat (26 million tons), rice (10.2 million tons), maize (6.1 million tons), and cotton (5.3 million tons). Around 4.5 million tons of fertilizers were used in Pakistan in 2016, and a further 913,000 tons were imported into the country that year.

Figure A.61: Agriculture's Share of National Gross Domestic Product and Employed Labor Force, Pakistan, 2002–2015



GDP = gross domestic product.

Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Agricultural Trade

Pakistan imported $7.1 billion worth of agricultural goods in 2016, compared with $3.7 billion in agricultural exports. Pakistan's main agricultural export commodities were rice ($1.7 billion), wheat flour ($173 million), tangerines and mandarins ($158 million), beef ($155 million), sugar ($123 million), and dates ($103 million). Palm oil was Pakistan's main food import at $1.7 billion, followed by cotton lint ($581 million), tea ($490 million), rapeseed ($464 million), soybeans ($383 million), and coffee ($329 million).

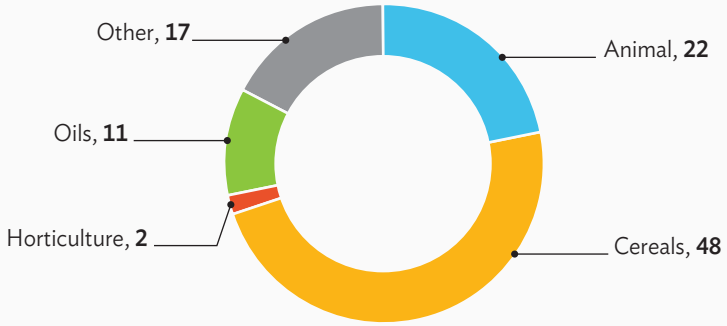
Food Security

Food Intake

The average daily per capita calorific intake was estimated at 2,440 kcal in 2013. Figure A.62 displays the proportion of calorific intake contributed by each of the major food groups. Cereals accounted for 48% of daily calorific intake in 2013. Calorific intake from animal sources comprised 22%, while fruit and vegetables accounted for 2%. The average daily per capita protein consumption was estimated at 65.5 grams, while the average dietary energy supply adequacy was estimated to be 108% in 2015–2017.

Figure A.62: Share of Daily Kilocalorie per Capita by Food Group, Pakistan, 2013

(%)



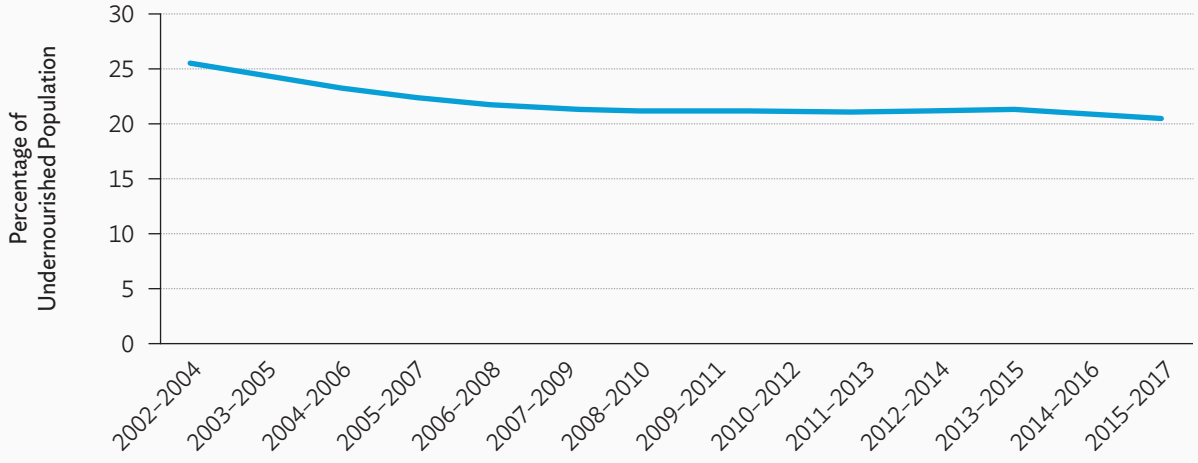
Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Malnutrition

The prevalence of undernourishment expresses the probability that a randomly selected individual from the country consumes an inadequate number of calories to cover his/her energy requirement, according to FAO criteria (Figure A.63). During 2015–2017, this figure was 20.5%, representing a steady but gradual decrease since early 2000. Undernourishment is a lingering problem in parts of Pakistan.

Figure A.63: Undernourished Population, Three-Year Average, Pakistan, 2002–2017

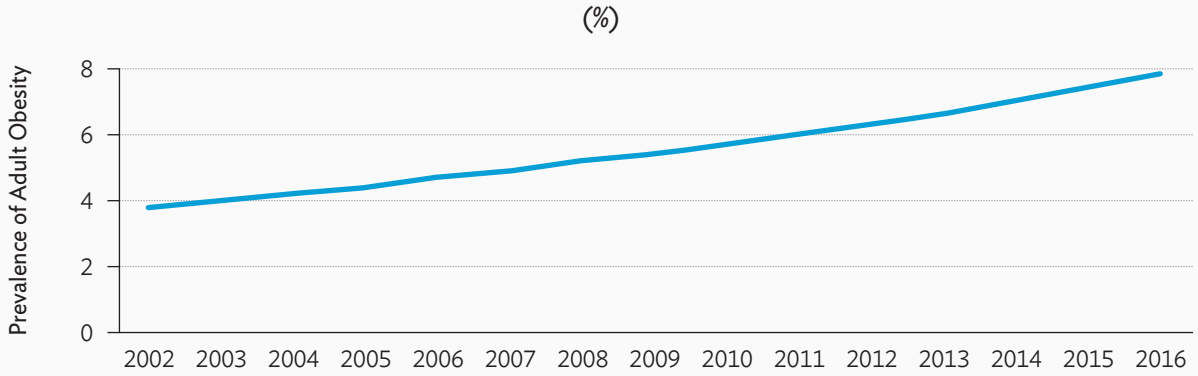
(%)



Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Obesity is an increasing problem in developing countries, including CAREC. Anthropometric data show that this is a minor but growing problem in Pakistan. Obesity had been steadily increasing from 3.8% in 2002 to 7.8% in 2016. The prevalence of obesity is low compared with other CAREC countries but demonstrates the same upward long-term trend.

Figure A.64: Prevalence of Adult Obesity, Pakistan, 2002–2016



Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Conclusions

Constraints

Pakistan's vast natural resource endowments allow it to produce a wide variety of agricultural products and participate actively in the export of these commodities. It is among the leading producers of several niche horticultural products and staple foods such as rice and wheat. However, agricultural productivity is relatively low compared with global competitors with similar agroclimatic conditions. Agricultural households are constrained by their access to land, as policy makers have struggled to overcome staunch political opposition to implement reform. Meanwhile, the government continues to intervene in certain aspects of agricultural marketing. Moreover, Pakistan has suffered from weather-related and other natural disasters that could be exacerbated by the effects of climate change. Investment in infrastructure, wider access to agricultural credit, land reform, and policy emphasis on climate resilience will help Pakistan achieve higher rates of productivity growth in its agriculture sector.

Potential for Agricultural Development

Pakistan's policy makers have focused on enhancing crop productivity through research into more suitable crop varieties, improved water use efficiency (delivery and application) and modernized irrigation, promotion of high-value export crops, better distribution of credit, better postharvest and marketing mechanisms, and improved access to inputs. However, constraints on Pakistan's agriculture sector are confounded by problems in public policy and governance. Pakistan must lay the groundwork for identifying and implementing targeted policy strategies that involve active stakeholder participation.

TAJIKISTAN

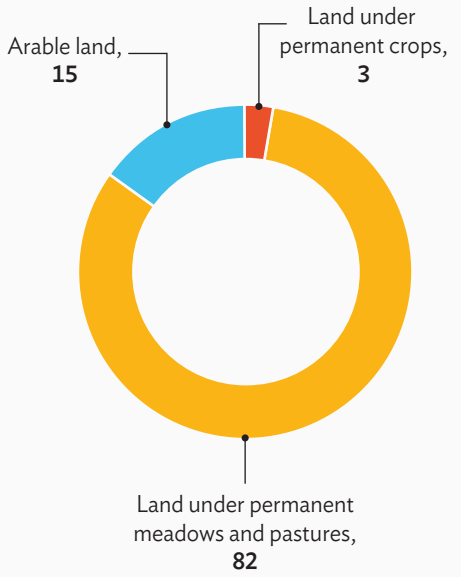
Tajikistan is a landlocked country in Central Asia with a total population of about 9.3 million (of which 6.7 million or 70% live in rural areas). Afghanistan borders it to the south, Uzbekistan to the west, the Kyrgyz Republic to the north, and the PRC to the east. Around 93% of the country is covered by mountains that pose specific challenges for agriculture. Limited agricultural areas are wedged into narrow valleys between high mountain ranges. Its topography and terrain hinder access to the more lucrative markets in neighboring countries. Improved relations with Uzbekistan have enhanced connectivity to export opportunities. The country's limited economic diversity and heavy reliance on overseas remittances make Tajikistan vulnerable to various environmental, political, and economic shocks.

Resource Endowment and Input Usage

Land Resources

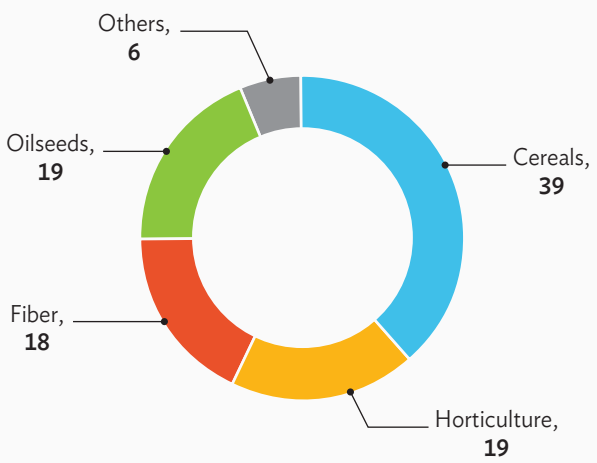
In 2016, some 33% (4.7 million ha) of Tajikistan's land was utilized for agriculture. Of the total agricultural area, around 15% (705,000 ha) is arable, 82% (3.9 million ha) is classified as permanent meadow and pasture land, and 3% (140,000 ha) is planted with permanent (perennial) or plantation crops (Figure A.65). Crops produced in Tajikistan include cereals (39% of the cropped area), followed by horticulture (19%), oilseeds (19%), fiber crops (18%), and other crops (6%) (Figure A.66).

Figure A.65: Agricultural Land Types, Tajikistan, 2016
(%)



Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Figure A.66: Share of Cultivated Land by Crop Type, Tajikistan, 2014
(%)



Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Water Resources

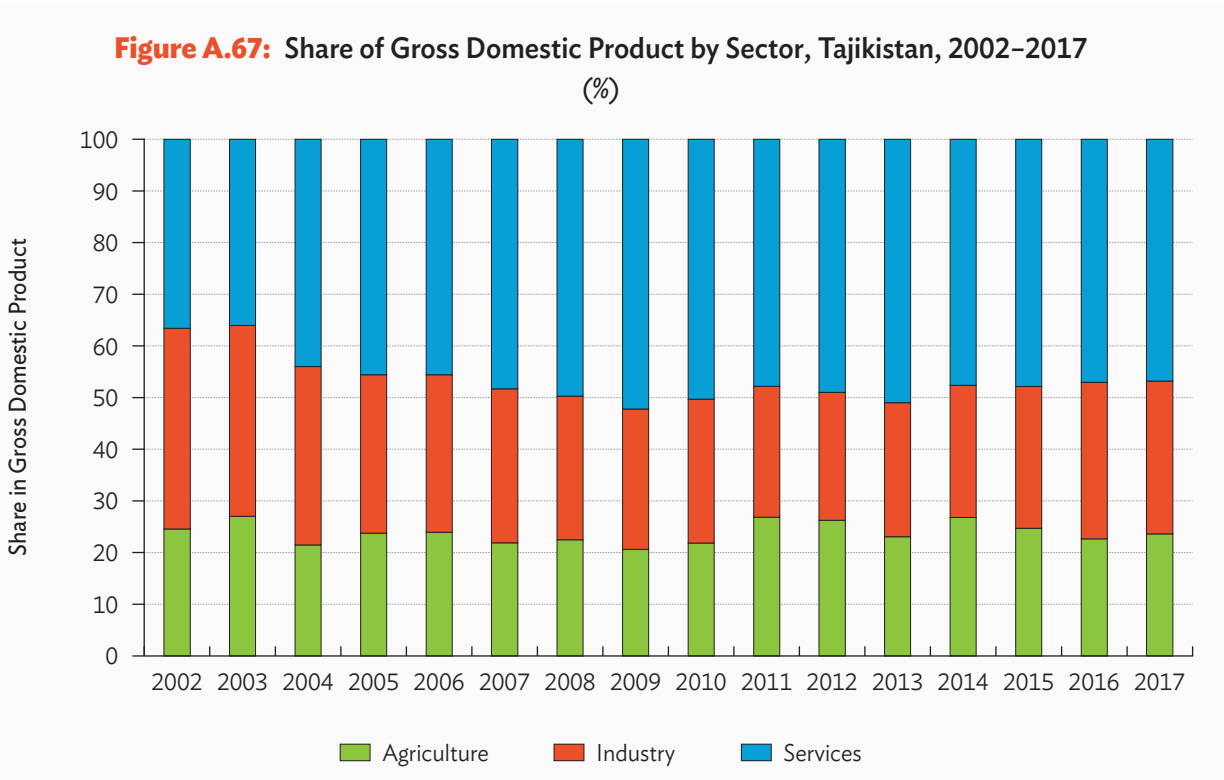
Tajikistan has an annual water supply of around 63 billion m^3, of which around 60 billion m^3 is classified as internally produced surface water and 6 billion m^3 comes from internally produced groundwater, with an overlap of 3 billion m^3. The country's inland water resources originate from rainfall and runoff from four major basins: (i) Kafernigan, (ii) Pyanj, (iii) Syr Darya, and (iv) Vakhsh. Of Tajikistan's 1.6 million ha of potentially irrigable land, only 742,100 ha (roughly 47%) is developed with irrigation structures and facilities. The main users of available water in Tajikistan are irrigated agriculture (about 85%–90% of the available water in recent years), followed by municipal and industrial consumption.

Agriculture and the Economy

Macroeconomic Trends

A significant portion of Tajikistan's economy is derived from its agriculture sector. Agriculture's share in national output has remained steady since 2000 but declined in the latter half of the 2000s. In 2017, agriculture accounted for 23.6% of total GDP, compared with 20.6% in 2009 and 24.6% in 2002 (Figure A.67). Currently, the services sector is the largest contributor to national GDP. In 2016, total agricultural output was approximately $1.4 billion, compared with the national GDP of $7.0 billion. Tajikistan's per capita GDP in 2016 was $796.

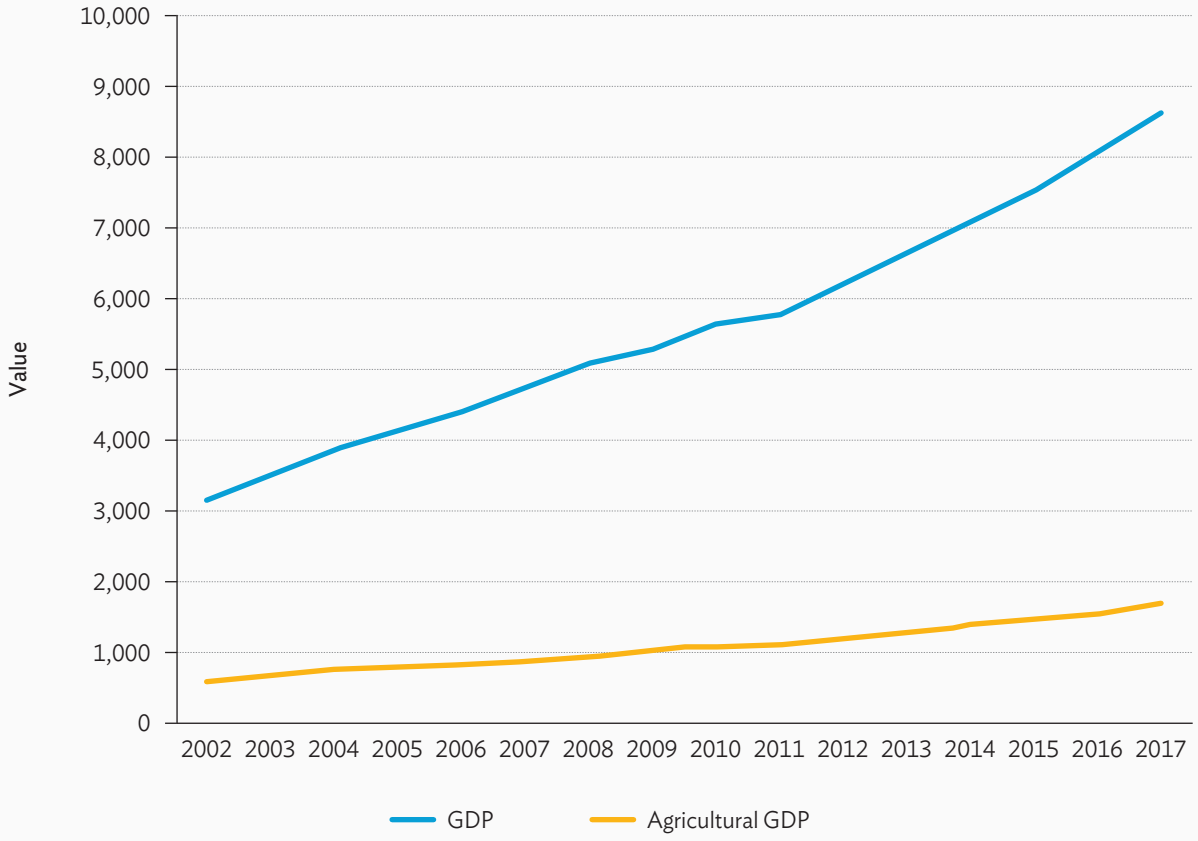
Figure A.67: Share of Gross Domestic Product by Sector, Tajikistan, 2002–2017



Source: Asian Development Bank.

Figure A.68 indicates the growth of national and agricultural GDP, highlighting the significantly slower rate of growth of the latter compared with other sectors.

Figure A.68: Growth of Agricultural and Total Gross Domestic Product, Tajikistan, 2002–2017
($ million, 2010 prices)



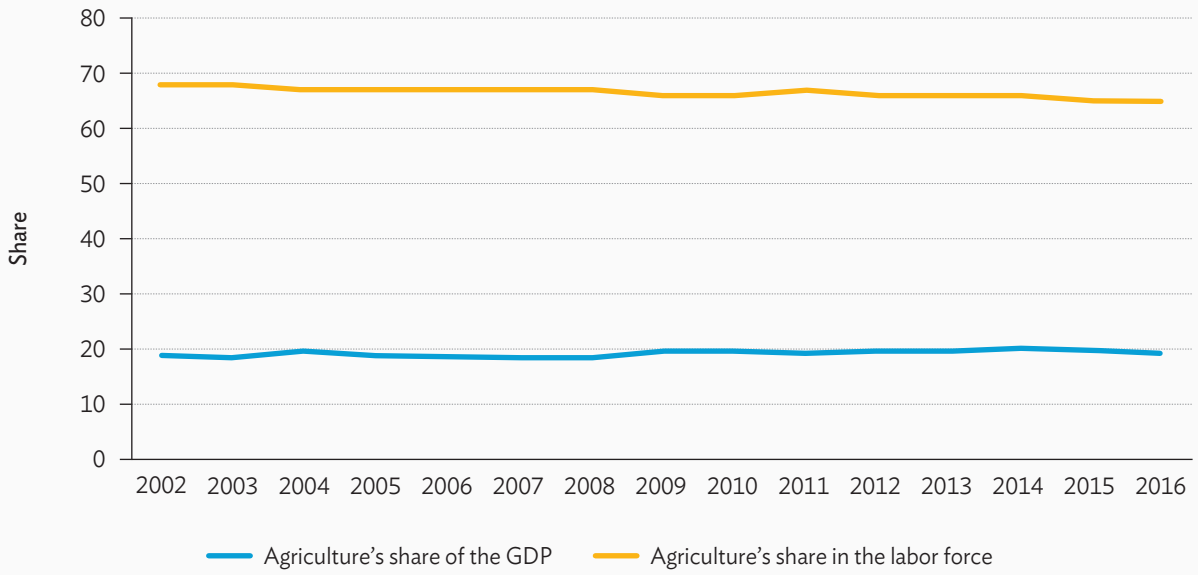
GDP = gross domestic product.

Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Figure A.69 provides a comparison of agriculture's share of the national GDP and its share of the employed labor force. The figures suggest a slight decrease in agricultural labor compared with other sectors since the early 2000s, from 67.6% in 2002 to 64.5% in 2016. There is still a significant gap between agriculture's share of labor and output that has largely remained steady.

Figure A.69: Agriculture's Share of National Gross Domestic Product and Employed Labor Force, Tajikistan, 2002–2016

(%)



GDP = gross domestic product.

Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Agricultural Production

Approximately 79% of agricultural production is generated by the cropping sector, compared with 21% by livestock. Potatoes were the highest value commodity produced in Tajikistan in 2016 at $182 million. Other significant commodities included cow's milk ($169 million), wheat ($162 million), apples ($146 million), onions ($124 million), and cottonseed ($120 million). Wheat is produced in the greatest quantities estimated at 917,000 tons. Other important products included potatoes (898,000 tons), watermelons (594,000 tons), onions (557,000 tons), and tomatoes (362,000 tons). Around 59,000 tons of fertilizer were used in Tajikistan in 2017, and a further 11,000 tons were imported into the country that year.

Agricultural Trade

Tajikistan imported $630 million worth of agricultural goods in 2016, compared with $100 million in agricultural exports. Tajikistan's main agricultural exports in 2016 were cotton lint ($60 million), onions ($9.1 million), tomatoes ($7.3 million), dried apricots ($4.9 million), other dried fruits ($4.1 million), and rice ($2.8 million). Wheat was Tajikistan's main food import at $185 million, followed by sugar ($111 million), sunflower oil ($29 million), wheat flour ($27 million), cottonseed oil ($25 million), and chocolate products ($24 million).

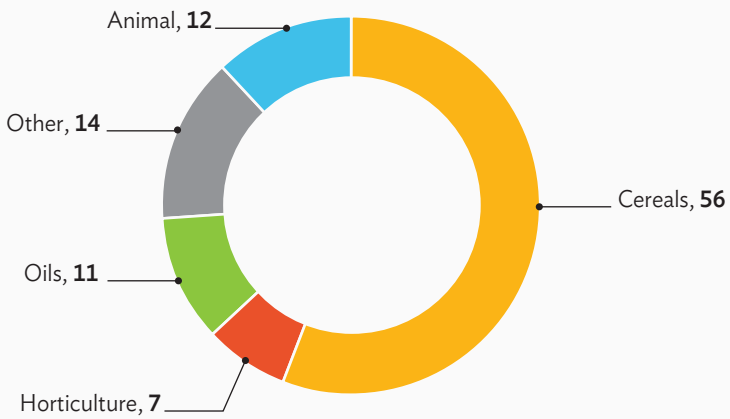
Food Security

Food Intake

The average daily per capita calorific intake was estimated at 2,201 kcal in 2013. Figure A.70 reports the daily calorific intake contributed by each of the major food groups. Cereals accounted for 55% of daily calorific intake in 2013. Calorific intake from animal sources comprised 12%, while fruit and vegetables accounted for 7%. The average daily per capita consumption of protein was estimated at 63.4 grams, while the average dietary energy supply adequacy was estimated to be 97% in 2015–2017. This still falls short of complete adequacy but represents a long-term increase from a low 86% in the early 2000s.

Figure A.70: Share of Daily Kilocalorie per Capita by Food Group, Tajikistan, 2013

(%)



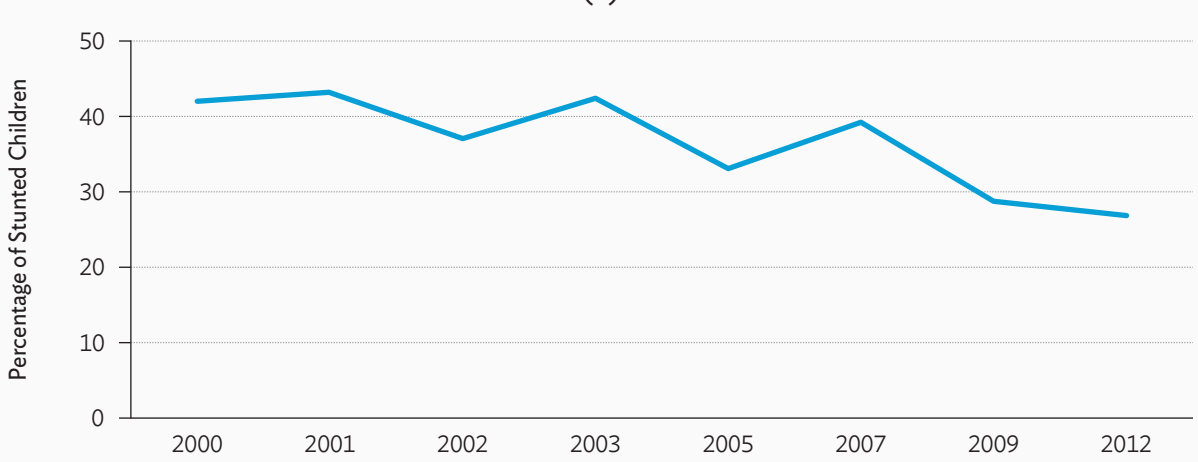
Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Malnutrition

Figure A.71 shows the medium-term trend of undernourishment in Tajikistan with the percentage of stunted children under 5 years of age. The prevalence of stunting expresses the probability that a randomly selected child from the country falls under two standard deviations from the mean in terms of height, based on FAO criteria. In 2012, this figure was 26.8%, representing a steady decrease since the early 2000s. This is a significant decrease from levels seen in the early 2000s when the prevalence of child stunting was over 40%.

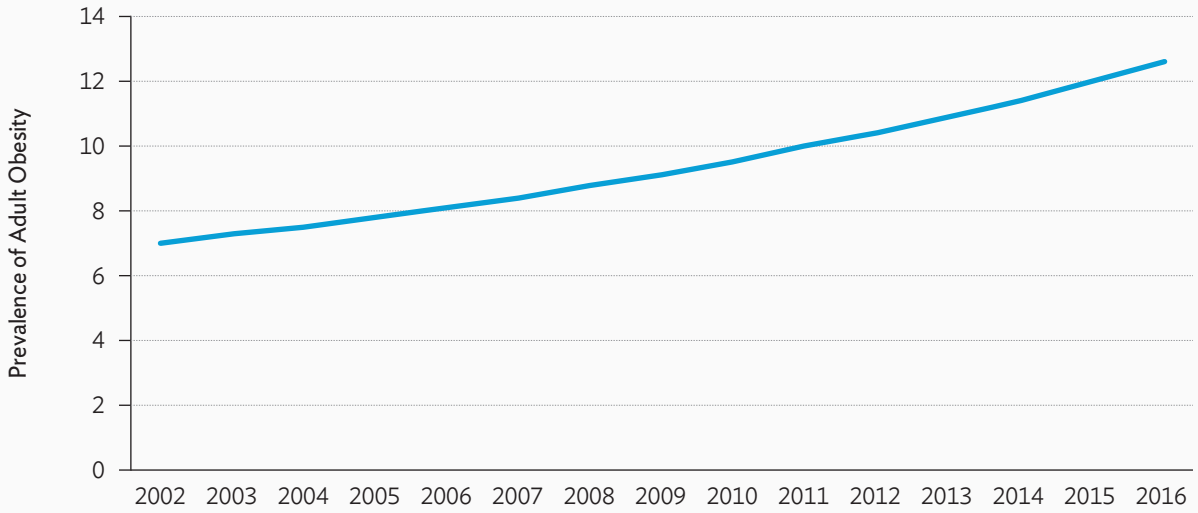
Obesity is an increasing problem in developing countries, including CAREC. Anthropometric data show that this has grown from a minor to a significant problem in Tajikistan. Obesity has increased rapidly from 7% in 2002 to 12.6% in 2016 (Figure A.72). The prevalence of obesity is moderate compared with other CAREC countries and demonstrates the same upward long-term trend.

Figure A.71: Stunted Children under 5 Years of Age, Tajikistan, 2000–2012



Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Figure A.72: Prevalence of Adult Obesity, Tajikistan, 2002–2016



Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Conclusions

Constraints

Although Tajikistan has plentiful water resources, it has very limited arable land and limited hydrocarbon resources. The government has long sought to harness Tajikistan's hydroelectric potential to alleviate its energy shortages and create earnings from electricity exports. In the 2010s, Tajikistan has largely abandoned policies aimed at staple food self-sufficiency and moved to areas such as horticulture, where its agroclimatic conditions provide a comparative advantage. The growing role of horticulture in Tajikistan's agriculture must balance against persisting demands for wheat sufficiency and the growing of cotton that still provides a large share of export earnings. Tajikistan faces many of the same challenges as other small countries in the region in terms of land fragmentation and a dearth of support services to sustain productivity in such an environment. With limited internal agricultural capacity, Tajikistan requires better connectivity and trade with neighboring countries, which has been a chronic problem in the past. Increasing investment in transport infrastructure and better relations with Uzbekistan and the Kyrgyz Republic have somewhat remedied the situation in recent years.

Potential for Agricultural Development

Tajikistan's agriculture requires considerable investment, especially in support services and infrastructure, to help its largely smallholder-oriented farming community to make productivity gains. Data suggest that Tajikistan is starting to shift production to higher-value crops such as fruit, vegetables, and nuts, where it appears to have comparative advantages. For these products to become a reliable and lucrative source of export earnings, Tajikistan's horticultural sector requires substantial support in terms of infrastructure and regulatory services (quality assurance and phytosanitary certification), which are currently lacking. Improved access to technical knowledge and a focus on resilient agriculture will also be important as the country begins to face the effects of climate change.

TURKMENISTAN

Turkmenistan is a country in Central Asia bordered to the north by Kazakhstan and Uzbekistan, to the southeast by Afghanistan, to the southwest by Iran, and to the west by the Caspian Sea. With a total population of about 5.9 million (of which 3 million or 51% reside in rural areas), Turkmenistan had one of the fastest-growing economies in the world in the early 2010s but has since weathered slumps in commodity prices that slowed growth. It has abundant natural gas, oil, and other petrochemicals that have maintained economic growth. However, it is mostly desert areas, and agriculture has not grown together with the energy sector. Reliable data on Turkmenistan are difficult to access, often precluding an accurate assessment of its largely unreformed agriculture sector.

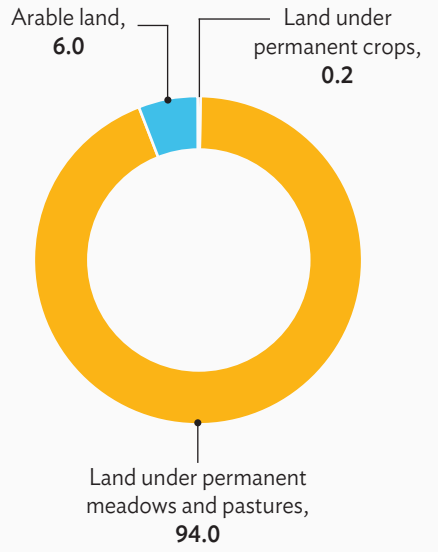
Resource Endowment and Input Usage

Land Resources

In 2016, some 69% (34 million ha) of Turkmenistan's land was utilized for agriculture. Of the total agricultural area, around 6.0% (2 million ha) is considered arable, 94.0% (32 million ha) is classified as permanent meadow and pasture, while 0.2% (70,000 ha) is categorized as permanent (perennial) or plantation crops (Figure A.73). Crops produced in Turkmenistan include cereals (54% of the cropped area), followed by fiber crops and oilseeds (each 21%), horticulture (3%), and other crops (1%) (Figure A.74).

Figure A.73: Agricultural Land Types, Turkmenistan, 2016

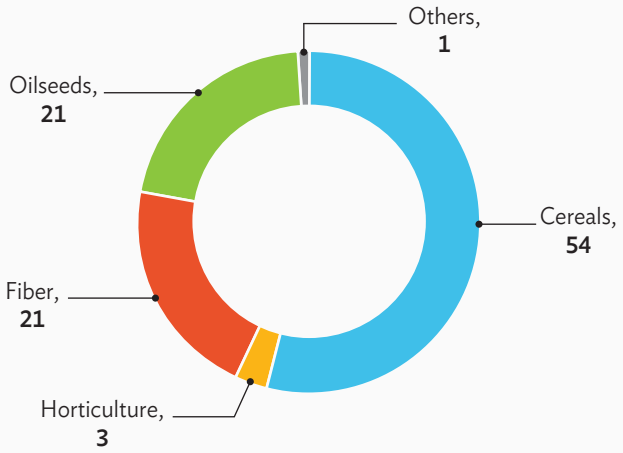
(%)



Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Figure A.74: Share of Cultivated Land by Crop Type, Turkmenistan, 2014

(%)



Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Water Resources

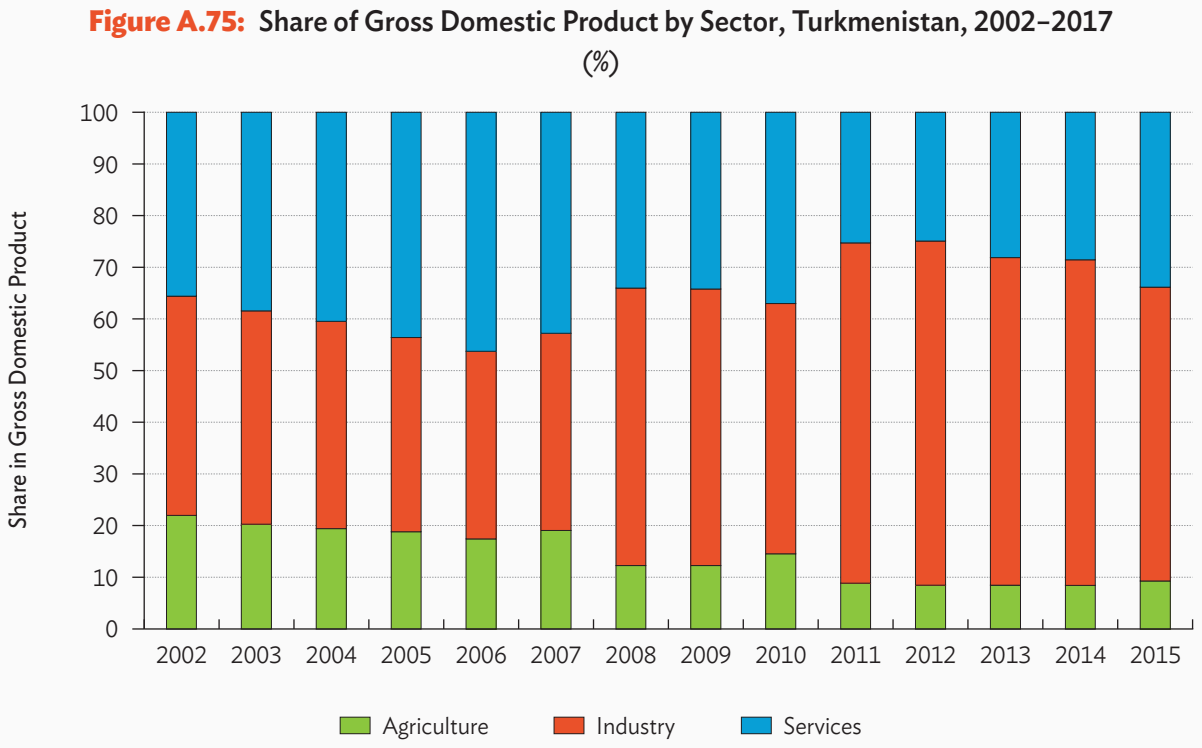
Turkmenistan has an annual water supply of around 1.4 billion m^3, of which around 1 billion m^3 is classified as internally produced surface water and 405 million m^3 comes from internally produced groundwater, with no overlap. The country's water supply originates mostly from the Amu Darya Basin, whose resources have been artificially extended by the Karakum Canal. Of Turkmenistan's 2.3 million ha of potentially irrigable land, 2.0 million ha (roughly 85%) is currently developed for irrigation. Turkmenistan is one of the largest users of water, not only in Central Asia but also in the world, consuming 6 million liters per inhabitant per year. Agriculture accounted for 94% of total water withdrawal in 2014.

Agriculture and the Economy

Macroeconomic Trends

A relatively small portion of Turkmenistan's economy is derived from its agriculture sector, and this share has decreased in recent decades. In 2015, agriculture contributed 9.3% to national GDP, compared with 12.3% in 2009 and 22% in 2002 (Figure A.75). Currently, the industrial sector is the largest contributor to national GDP. In 2016, total agricultural output was approximately $4.7 billion, compared with national GDP of $36.2 billion. Turkmenistan's per capita GDP in 2016 was $6,389.

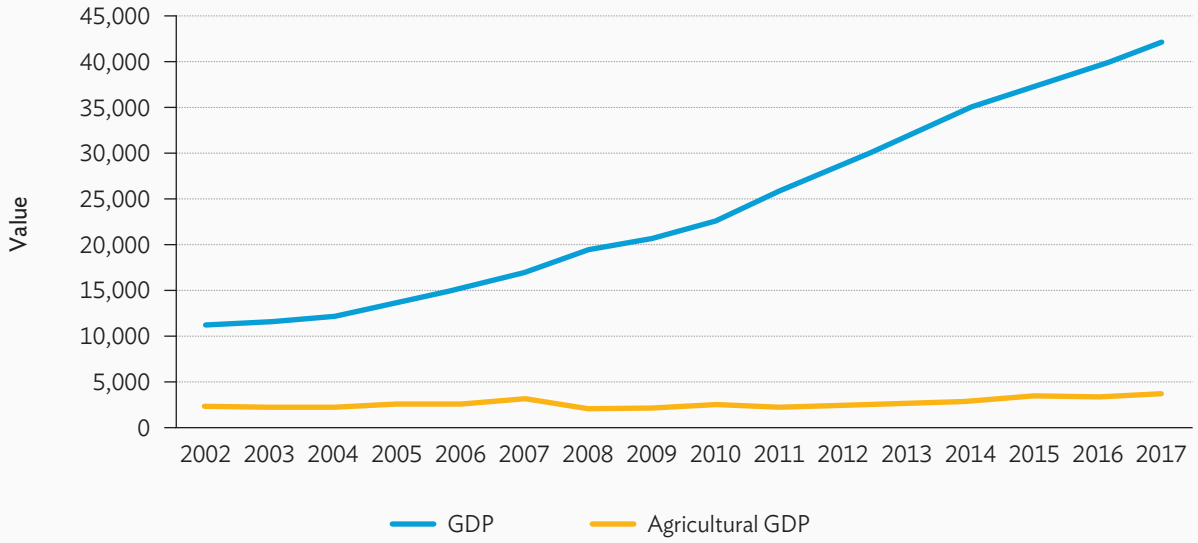
Figure A.75: Share of Gross Domestic Product by Sector, Turkmenistan, 2002–2017



Source: Asian Development Bank.

Figure A.76 indicates the growth of national GDP compared with agricultural GDP and reinforces the near stagnant level of the latter compared with other sectors of the economy.

Figure A.76: Growth of Agricultural and Total Gross Domestic Product, Turkmenistan, 2002–2014
($ million, 2010 prices)



GDP = gross domestic product.

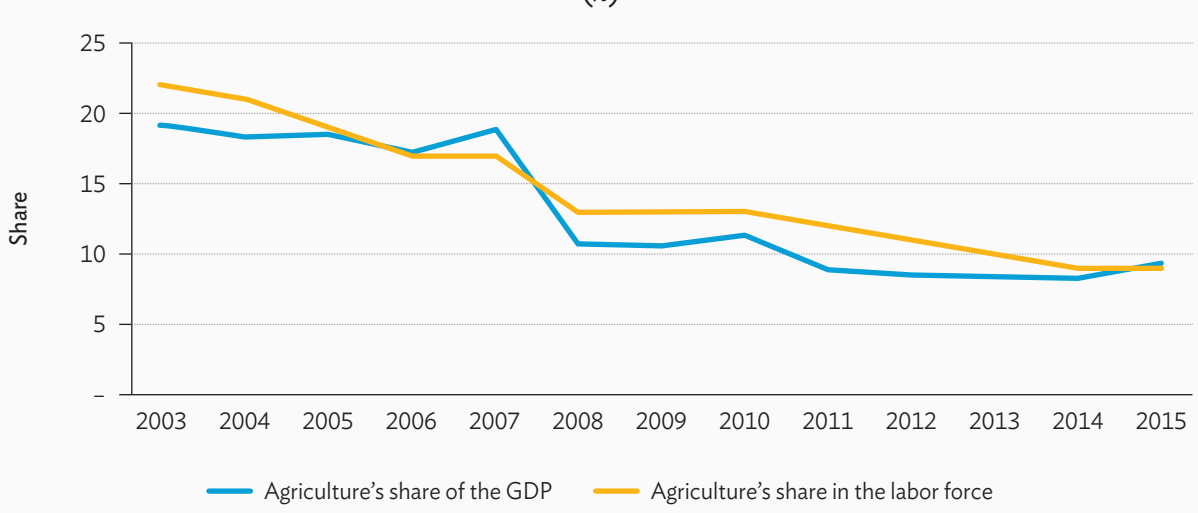
Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Figure A.77 compares agriculture's share of national GDP and its share of the employed labor force. It indicates a sharp decrease in both agricultural labor and output relative to other sectors. While both figures were around 20%–22% in the early 2000s, they have since decreased to around 9% by 2015.

Agricultural Production

Approximately 53% of agricultural production is derived from the cropping subsector, compared with 47% from livestock. Beef was the highest value commodity produced in Turkmenistan in 2016 at around $820 million. Other important commodities included cotton ($598 million), cow's milk ($527 million), wheat ($445 million), sheep meat ($261 million), potatoes ($112 million), and rice ($87 million). Wheat was the greatest quantity at 1.6 million tons. Other important products included cotton (430,000 tons), tomatoes (426,000 tons), potatoes (306,000 tons), and grapes (288,000 tons).

Figure A.77: Agriculture's Share of National Gross Domestic Product and Employed Labor Force, Turkmenistan, 2003–2015



GDP = gross domestic product.

Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Agricultural Trade

Turkmenistan imported $447 million worth of agricultural goods in 2016, compared with $280 million in agricultural exports. Turkmenistan's main agricultural export in 2016 were cotton ($226.0 million), cottonseed ($22.0 million), crude materials ($17.0 million), hides ($6.1 million), cotton waste ($5.2 million), wool ($2.0 million), and tomatoes ($1.1 million). Wheat is Turkmenistan's key agricultural import valued at $104 million, followed by processed foods ($25 million), sunflower oil ($22 million), chocolate products ($20 million), wheat flour ($17 million), and rice ($17 million).

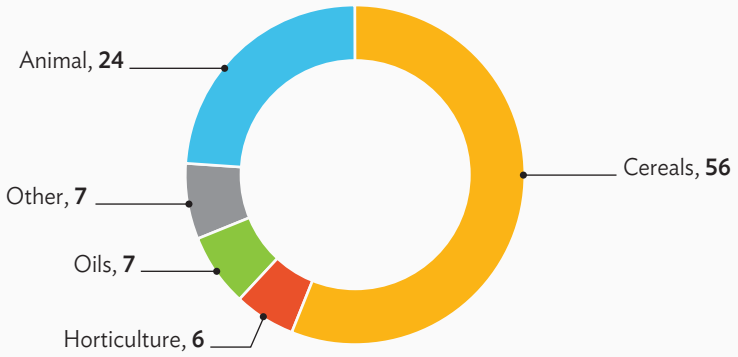
Food Security

Food Intake

The average daily per capita calorific intake was estimated at 2,840 kcal in 2013. Figure A.78 presents the proportion of calorific intake contributed by each of the major food groups. Cereals accounted for 56% of daily calorific intake in 2013. Calorific intake from animal sources comprised 24%, while fruit and vegetables accounted for 6%. The average daily per capita protein intake was estimated at 90.4 grams, while the average dietary energy supply adequacy was estimated to be 121% in 2015–2017.

Figure A.78: Share of Daily Kilocalorie per Capita by Food Group, Turkmenistan, 2013

(%)



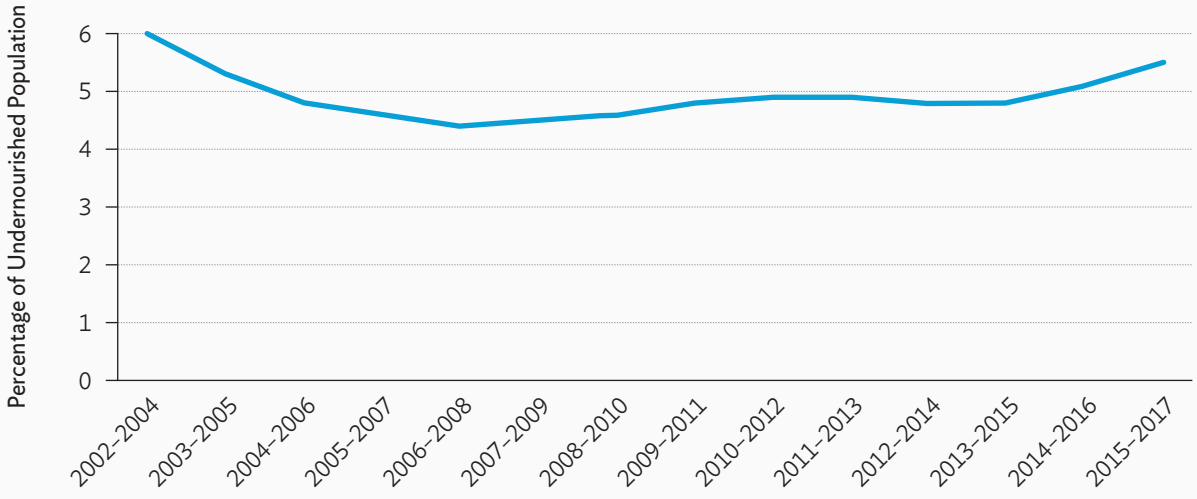
Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Malnutrition

The prevalence of undernourishment expresses the probability that a randomly selected individual from the country consumes an inadequate number of calories to cover his/her energy requirement, based on FAO criteria (Figure A.79). During 2015–2017, this figure was 5.5%, representing a slight increase since the early 2010s. This suggests that, although the problem of undernourishment is relatively small in Turkmenistan, it persists despite gains in other indicators.

Figure A.79: Undernourished Population, Three-Year Average, Turkmenistan, 2002–2017

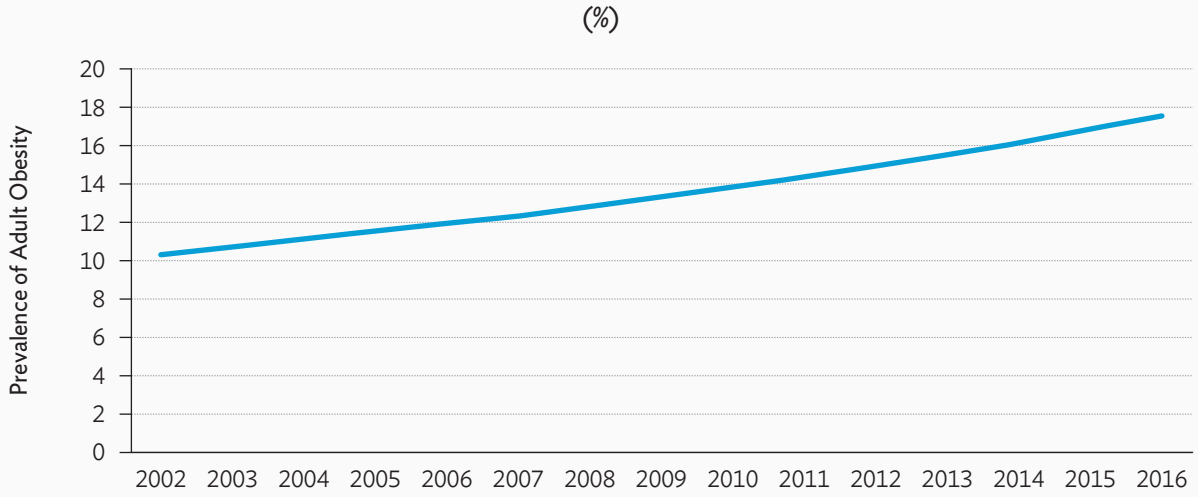
(%)



Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Obesity is an increasing problem in developing countries, including CAREC. Anthropometric data show that this has become a significant problem in Turkmenistan. Obesity had been rapidly increasing from 10.3% in 2002 to 17.5% in 2016. The prevalence of obesity is moderately high compared with other CAREC countries and demonstrates the same upward long-term trend as seen in the others.

Figure A.80: Prevalence of Adult Obesity, Turkmenistan, 2002–2016



Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Conclusions

Constraints

Turkmenistan is highly dependent on irrigation due to its arid climate, which will exacerbate under the impacts of climate change. Turkmenistan's agriculture sector is still under heavy state control, and intervention in the country's most important crops (wheat, cotton, rice, and sugar) calls into question the sector's efficiency. Moreover, farmers are obliged to sell to the state often below market prices. Although Turkmenistan is a major exporter of energy, its agricultural products (except cotton) are rarely seen overseas. The lack of reliable data creates obstacles for better research and policymaking.

Potential for Agricultural Development

Investment in irrigation is an urgent priority in Turkmenistan because of the country's limited water resources. Although agriculture is heavily controlled by the state, there are some minor subsectors, especially horticulture, where farmers have more freedom in terms of marketing. Unlike other Central Asian countries, leaseholder farming, in which tenant farmers lease from the state, is widely practiced under procurement agreements. It is worth considering whether reforming this aspect of Turkmenistan's agriculture can lead to productivity gains, along with agricultural diversification and pro-market policies in general.

UZBEKISTAN

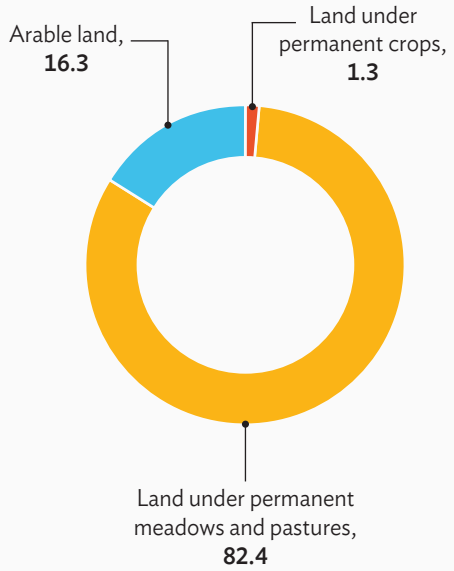
With more than 33 million inhabitants (half of which live in rural areas), Uzbekistan is the most populous country in Central Asia. It shares borders with Kazakhstan and the Aral Sea to the north, Turkmenistan to the south, Tajikistan to the southeast, and the Kyrgyz Republic to the northeast. Uzbekistan is a middle-income country and one of the fastest-growing economies in Eastern Europe and Central Asia region. Uzbekistan is endowed with considerable land and energy resources and has taken steps in recent years to develop its agriculture sector in parallel with the broader liberalization of its economy.

Resource Endowment and Input Usage

Land Resources

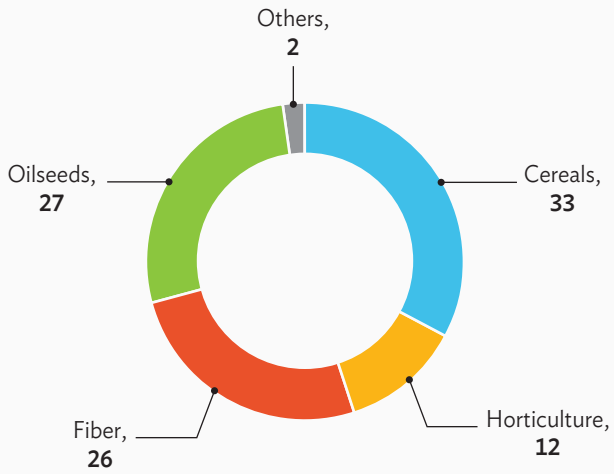
In 2016, some 60% (27 million ha) of Uzbekistan's land was utilized for agriculture. Of the total agricultural area, around 16.3% (4.4 million ha) is arable, 82.4% (22 million ha) is classified as permanent meadow and pasture land, and 1.3% (350,000 ha) is planted with permanent (perennial) or plantation crops (Figure A.81). Crops produced in Uzbekistan include cereals (33% of cropped area), followed by oilseeds (27%), fiber crops (26%), horticulture (12%), and other crops (2%) (Figure A.82).

Figure A.81: Agricultural Land Types, Uzbekistan, 2016
(%)



Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Figure A.82: Share of Cultivated Land by Crop Type, Uzbekistan, 2014
(%)



Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Water Resources

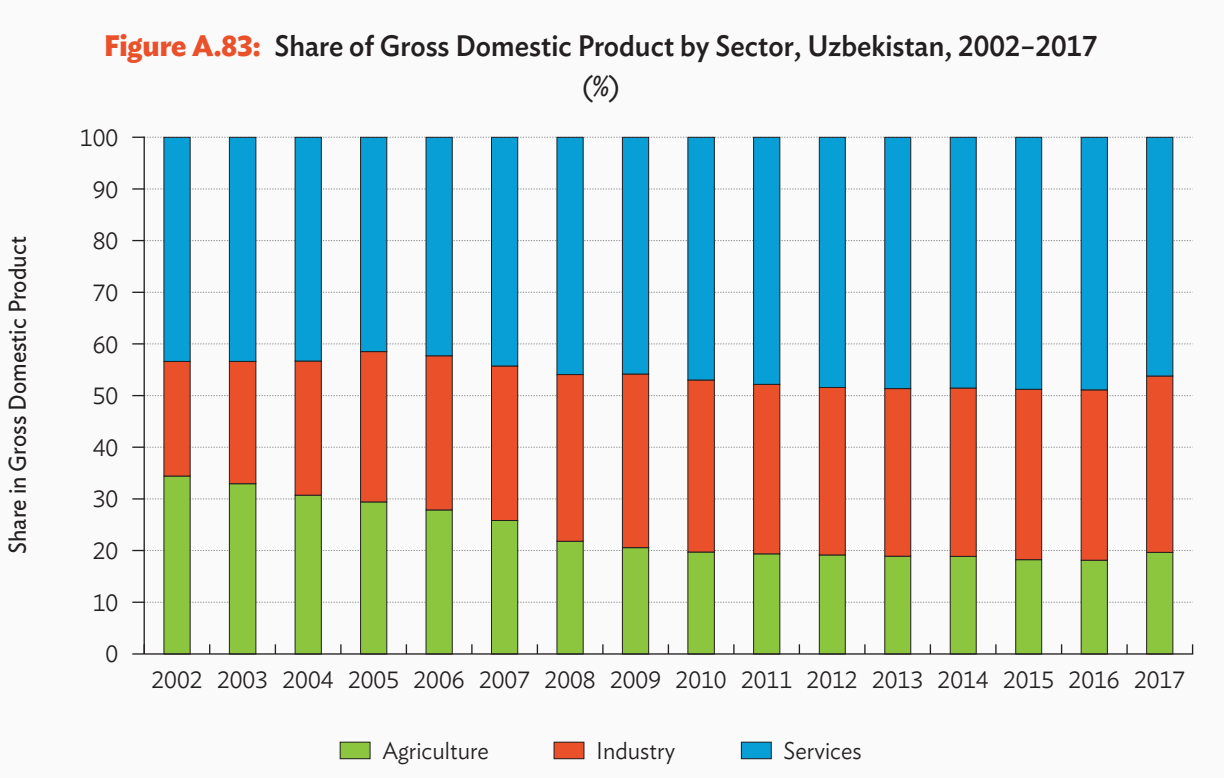
Uzbekistan has an annual water supply of around 16 billion m^3, of which around 9.5 billion m^3 is classified as internally produced surface water and 8.8 billion m^3 comes from internally produced groundwater, with an overlap of 2 billion m^3. The country's inland water resources originate from rainfall and runoff from four rivers forming the Aral Sea basin: (i) Amu Darya, (ii) Syr Darya, (iii) Kashka Darya, and (iv) Zarafshan. Of Uzbekistan's 4.9 million ha of potentially irrigable land, 4.2 million ha (roughly 85%) is currently developed for irrigation. According to the Ministry of Water Resources, Uzbekistan consumed an average of 51 billion m^3 of water in 2017, with agriculture accounting for 90% of water utilization.

Agriculture and the Economy

Macroeconomic Trends

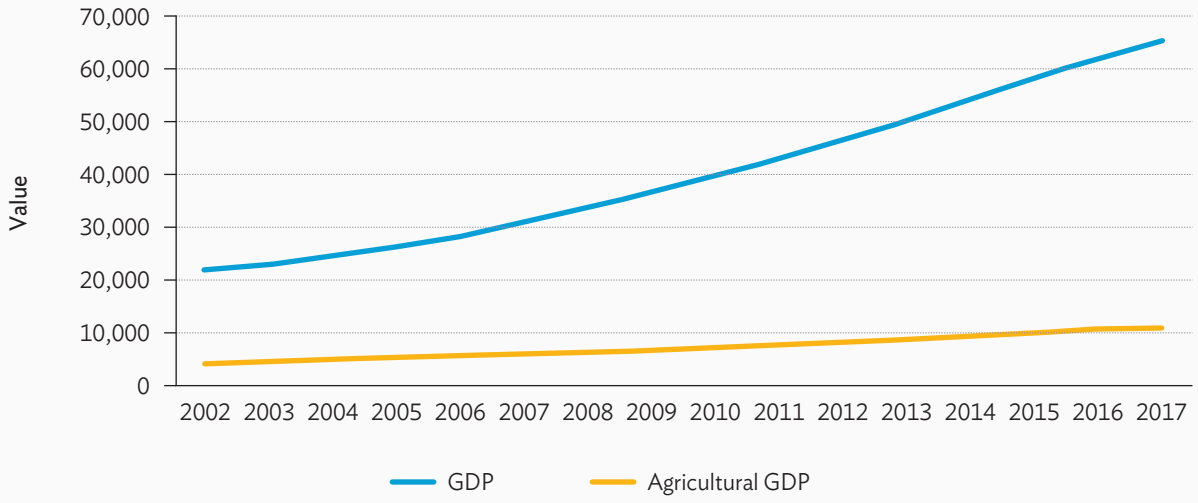
A relatively small portion of Uzbekistan's economic activity is related to its agriculture sector. Agriculture's already small share in national output has remained steady, following a decline in the early to mid-2000s. In 2017, agriculture accounted for 19.7% of total GDP, compared with 20.6% in 2009 and 34.5% in 2002 (Figure A.83). Currently, the services sector is the largest contributor to national GDP, and its share continues to increase. In 2016, the total agricultural output was approximately $11.4 billion, compared with the national GDP of $66.5 billion. Uzbekistan's per capita GDP in 2016 was $2,116.

Figure A.83: Share of Gross Domestic Product by Sector, Uzbekistan, 2002–2017



Source: Asian Development Bank.

Figure A.84: Growth of Agricultural and Total Gross Domestic Product, Uzbekistan, 2002–2017
($ million, 2010 prices)



GDP = gross domestic product.

Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Figure A.84 records the growth of total GDP and agricultural GDP, demonstrating the much slower growth rate of the latter compared with other sectors of the economy.

Figure A.85 provides a comparison of agriculture's share of the national GDP and its share of the employed labor force. The figure indicates that agriculture's share of output decreased more rapidly than its share of labor.

Agricultural Production

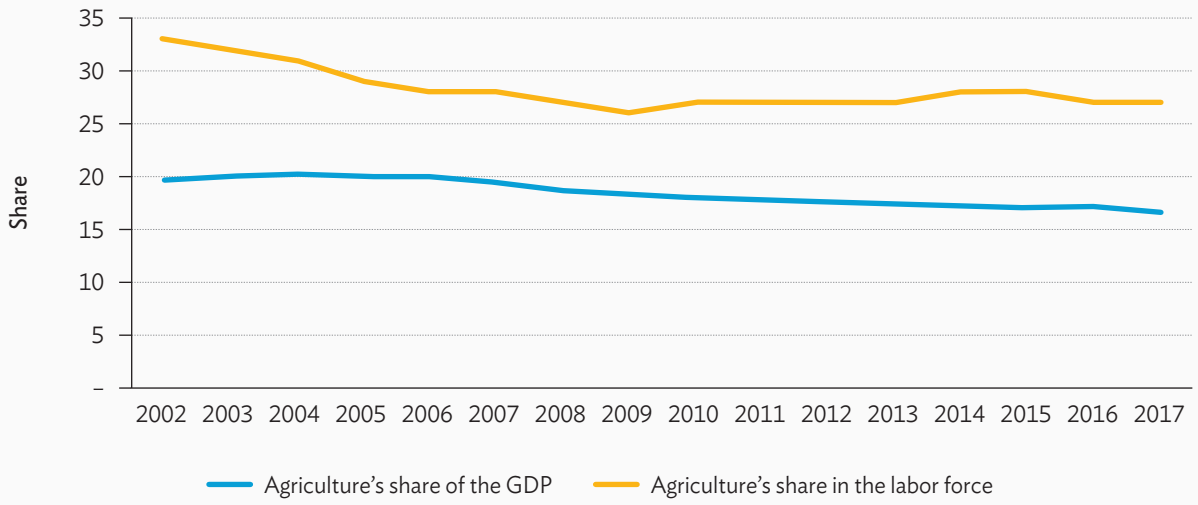
Wheat remains the crop produced in the greatest quantities at 6.9 million tons. Other important commodities included cotton (3.2 million tons), potatoes (2.7 million tons), tomatoes (2.5 million tons), carrots and turnips (2.1 million tons), watermelons (1.9 million tons), vegetables (1.8 million tons), grapes (1.6 million tons), onions (1.1 million tons), and apples (1.0 million tons). Around 823,000 tons of fertilizers were used in Uzbekistan in 2017, with 1.1 million tons being produced in-country that year.

Agricultural Trade

Uzbekistan imported $1.3 billion worth of agricultural goods in 2016, compared with $757 million of agricultural exports. Uzbekistan's main agricultural exports in 2016 were cotton ($177 million), raisins ($67 million), grapes ($62 million), cherries ($46 million), persimmons ($32 million), and beans ($29 million). Wheat was Uzbekistan's largest agricultural import at $234 million, followed by sugar ($180 million), wheat flour ($144 million), sunflower oil ($123 million), soybeans ($47 million), and tea ($44 million).

Figure A.85: Agriculture's Share of National Gross Domestic Product and Employed Labor Force, Uzbekistan, 2002–2017

(%)



GDP = gross domestic product.

Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Food Security

Food Intake

The average daily per capita calorific intake was estimated at 2,760 kcal in 2013. Figure A.86 presents the proportion of calorific intake by each of the major food groups. Cereals accounted for 51% of daily calorific intake in 2013. Calorific intake from animal sources comprised 18%, while fruit and vegetables accounted for 12%. The average daily per capita protein intake was estimated at 83.4 grams, while the average dietary energy supply adequacy was estimated to be 115% in 2015–2017, which is a steady long-term increase.

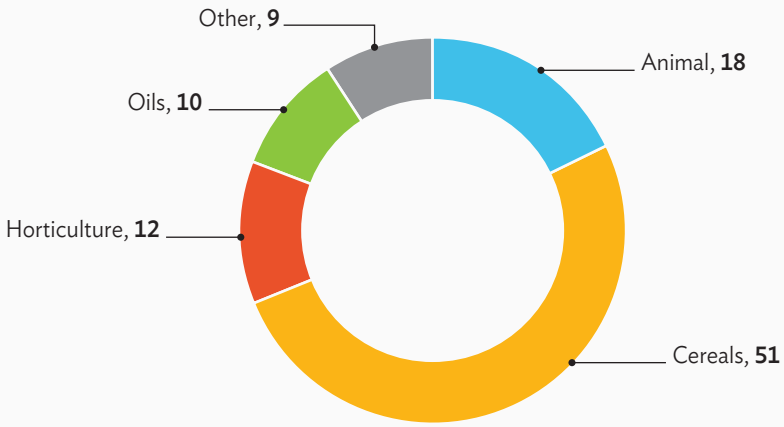
Malnutrition

The prevalence of undernourishment expresses the probability that a randomly selected individual from the country consumes an inadequate number of calories to cover his/her energy requirement, based on FAO criteria (Figure A.87). During 2015–2017, this was 7.4%, representing a steadily declining trend since the early 2010s after a rapid decrease during the 2000s. However, the fall in undernourishment has stalled in recent years, suggesting that the problem persists in certain areas.

Obesity is an increasing problem in developing countries, including CAREC. Anthropometric data show that this is becoming a significant problem in Uzbekistan. Obesity had been rapidly increasing from 8.9% in 2002 to 15.3% in 2016 (Figure A.88). The prevalence of obesity is moderately high compared with other CAREC countries and demonstrates the same upward long-term trend.

Figure A.86: Share of Daily Kilocalorie per Capita by Food Group, Uzbekistan, 2013

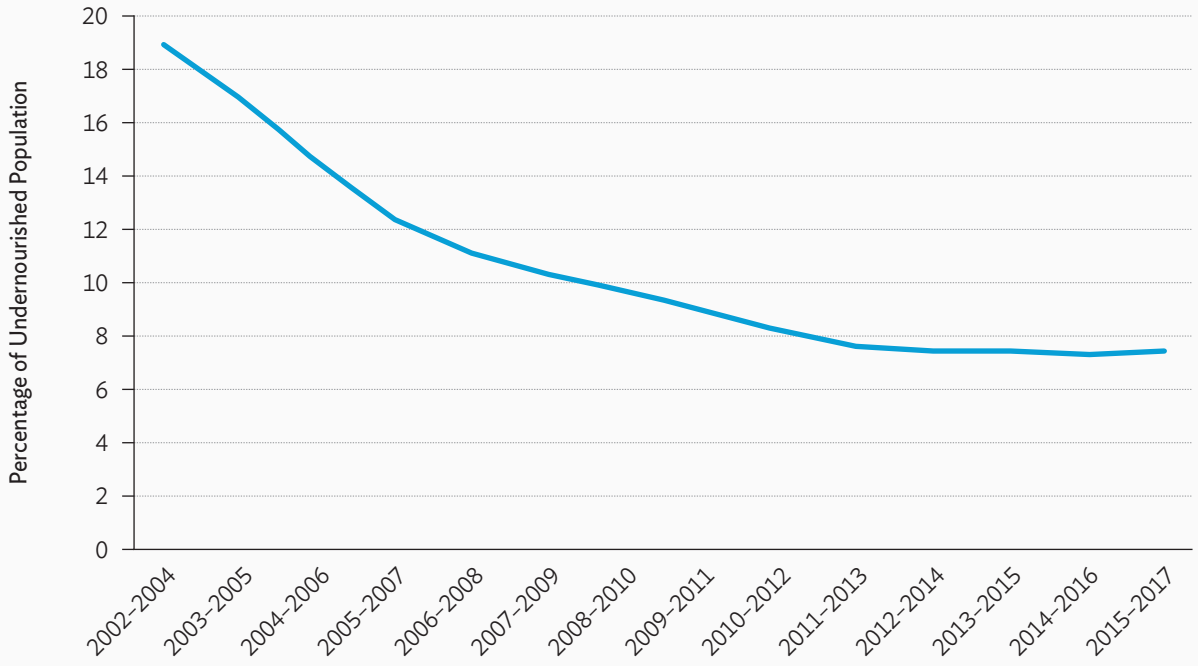
(%)



Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

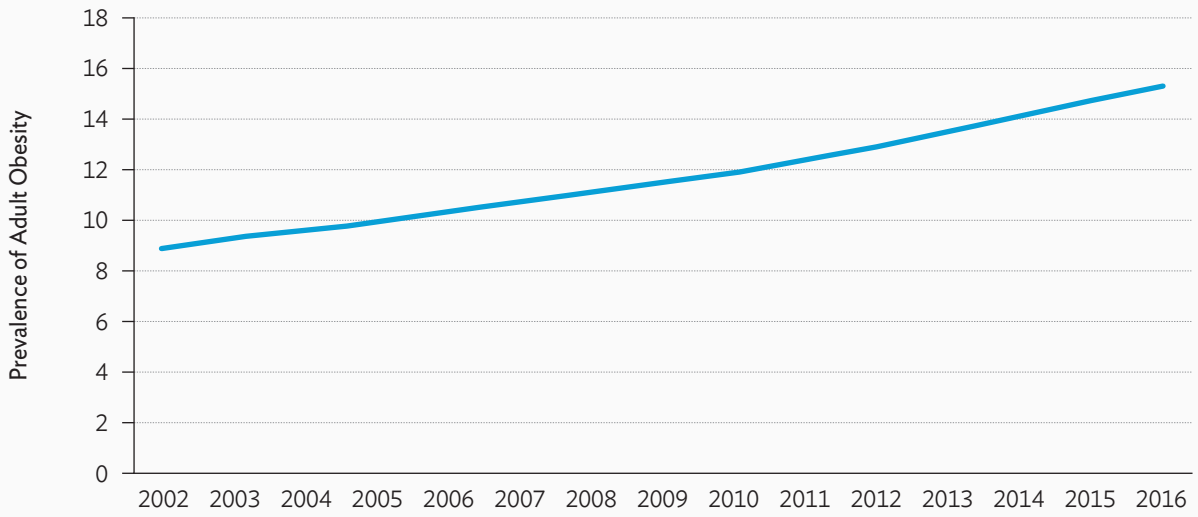
Figure A.87: Undernourished Population, Three-Year Average, Uzbekistan, 2002–2017

(%)



Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Figure A.88: Prevalence of Adult Obesity, Uzbekistan, 2002–2016



Source: Food and Agriculture Organization of the United Nations. FAOSTAT. http://www.fao.org/faostat/en/#home (accessed 31 October 2019).

Conclusions

Constraints

Uzbekistan's agriculture sector has considerable potential but also faces significant challenges. While Uzbekistan is among the world's top exporters of some horticultural products, it requires additional investment in logistics and infrastructure to take advantage of its favorable agroclimatic conditions. Irrigation infrastructure requires modernization, with waterlogging and salinity providing associated challenges. Because Uzbekistan's agriculture is highly dependent on irrigation, climate change in source regions, mostly outside its national territory, will have serious implications in the future. Problems such as climate change require international cooperation, and the current leadership of Uzbekistan has done a lot to repair ties with its neighbors, boosting the country's connectivity and trade relations.

Potential for Agricultural Development

Like neighboring countries such as the Kyrgyz Republic and Tajikistan, Uzbekistan has transitioned from staple food self-sufficiency as a primary food security strategy to increased agricultural diversification. Investment in the horticulture subsector can help promote Uzbekistan's agricultural products that have high global market potential. Improving storage facilities and transport routes and options will help extend the range of perishable items, and stronger regulatory controls will help the country gain access to more lucrative markets. While the country's internal transportation networks are adequate, fully unlocking Uzbekistan's potential will require improved international connections, which have been facilitated by closer ties with its neighbors.

Agriculture Development in the Central Asia Regional Economic Cooperation Program Member Countries

Review of Trends, Challenges, and Opportunities

The Central Asia Regional Economic Cooperation (CAREC) Program covers Central Asia, the South Caucasus, Mongolia, and the People's Republic of China. Agriculture in the CAREC region has undergone extensive country-specific policy, institutional, and structural changes. These have resulted in wide disparities in agricultural policy and levels of growth and development, which adversely affected the region's global trade performance. This report takes a comprehensive look at agricultural and food systems and recommends strategies to promote diversification and harmonization of cross-border customs and logistics procedures to revitalize agriculture in the CAREC region.

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